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I.

PRESENTATION OF MASTOID CASES, WITH REMARKS AND LANTERN SLIDE DEMONSTRATION, BEFORE THE CAMP SHERMAN, OHIO, MEDICAL SOCIETY, THURSDAY EVENING, APRIL 4, 1918.

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I desire this evening to present a list of the mastoid patients that have come to operation in this hospital during the past fourteen weeks, analyze the most important ones, and possibly bring out some points that may be of value, also discuss the causes that have handicapped our work in this particular class.

Medicine has become so diversified that few men master more than their own department, and no one can master all. This explains why many physicians still have a very hazy idea of the cause and effect of ear diseases.

There is probably no physician who would advise against

promptly draining an abscess anywhere else in the body, and put an end at the earliest possible moment to the danger of sepsis, metastasis, or through delay lowering of the resistive powers, thereby making the patient an easy victim to some intercurrent disease, and yet these same men can see no reason for prompt interference in mastoid complications, even if the symptoms are well marked.

I grant there is some excuse for this, because there exist, unfortunately, a large number of so-called specialists who have taken a six or a twelve weeks' special course, and attained a mere smattering of the special subject, and for lack of skill and knowledge either fail to recognize serious conditions, or if recognized, have not the necessary surgical skill, and hence keep putting off active interference in the hope that nature, with the help of local and internal treatment, will prevent fatal results. It does not matter to them that an acute purulent inflammation of the middle ear, including the mastoid cells, often passes into the chronic form in which the discharge of pus may cease, excepting at intervals after exposure, but the pathologic changes of every part of the middle ear are making slow but sure progress, till some day there is a sudden flare-up, great activity and virulence of the germs, generally streptococci, necrosis of the mucous membrane and bone, extension through the lymphatics, blood vessels, or by direct extension to the brain develop brain abscess or meningitis, with nearly always a fatal termination. This is the picture that so often comes true. The same thing, but in a lesser degree, applies to the accessory sinuses.

The reason for purulent inflammation in the maxillary antrum, the ethmoid cells, frontal and sphenoid sinuses being less fatal is that they are large cavities, with smooth walls, with fair opportunity for drainage, whereas the mastoid in twenty per cent is composed of one large cell, the antrum, and only a few smaller cells. In eighty per cent the whole mastoid resembles a sponge with numerous intercommunicating cells, several quite large, especially at the tip of the mastoid. These cells, once filled with pus, have no means of draining, excepting as the secretion, by pressure due to the constant increase of pus, finds its way from cell to cell upwards, against the law of gravity, and through the narrow

passage between the antrum and the attic of the tympanic cavity. Unfortunately, this is often closed by swelling of the lining membrane, and the virulent contents of the whole mastoid labyrinth of cells causes periostitis, with great tenderness and pain, strangulation of the blood supply, often resulting in necrosis of the mucous membrane and bone.

The destructive process may extend in any direction, outward through the cortical, forming a dissecting abscess under the periosteum, with resulting swelling behind and above the ear, and displacement of the latter. This is the safest way of exit, but unfortunately, it does not always take this course. It may extend backwards, involving the lateral sinus, or upwards through the roof of the mastoid antrum or the roof of the tympanic, causing an extradural or a brain abscess, or that most fatal of all, a purulent meningitis. In some cases the pyogenic bacteria enter the blood, chiefly through the lateral sinus, or gain entrance to the cerebrospinal fluid.

In some mastoid cases metastatic abscesses develop in different parts of the body or joints. Fresh foci of infection generally continue to form in spite of opening the abscesses as fast as they form, till the patient finally succumbs from exhaustion. If in addition to the metastatic abscesses we also have streptococcus infection of the blood, then the case is a desperate one.

Fortunately, we are able to present several cases this evening that have recovered.

From the picture which I have presented, it is self evident that the only rational way to deal with this class of cases is by prompt surgical interference, exactly the same as you do in inflammation of the appendix. Why longer cling to the absurd method of treating virulent affections of the ear by a different standard from that of other parts of the body? Certainly no other areas of infection are located in such close proximity to the vital parts, nor are any more avenues open for extension of the infection to parts that, when once involved, in nine cases out of ten the surgeon is absolutely helpless to render successful aid.

As the foregoing facts cannot be disputed, it is, therefore, a self evident proposition that the rule to operate at the earliest

possible moment is sound surgery, and should always be followed.

The rapidity with which the disease can involve the mastoid was shown in Case No. 37, which was operated seventy-two hours after the onset of an acute otitis media in an ear that had not been inflamed before, and yet the mastoid cells were filled with pus, and the lining membrane in the large cell at the tip was one-eighth of an inch thick.

The making of a simple mastoid operation, which is really only making a drain through the mastoid cortex and cells, is the same as making a drain into any other abscess cavity, and with proper knowledge of the anatomy and a perfect surgical technic, the operation of itself should be one hundred per cent safe.

But there are several other important after-considerations in connection with these cases which cause this class to be different from operations in other parts of the body, and place the results often beyond the control of the operator.

First of all, we must remember that while the opening and draining of the mastoid is under the surgeon's control, there remains in direct communication with this wound, through the passage to the tympanic cavity, an infected area that cannot be made sterile, a cavity that stands in direct communication through the eustachian tube with the infected nasopharynx, tonsils, and often one or more infected nasal sinuses. In fact, we must remember that an inflammation per se does not start in a healthy middle ear in ninety-nine out of a hundred cases, but is the result of a direct extension from the nose and pharynx; that fifty per cent or more of adults have latent or active sinus involvement swarming with bacteria, whose activity is influenced by several factors, such as constipation, overloading of the stomach with food or alcoholics, causing fermentation, with resulting formation of toxins. If to this there is added undue exposure with the lowering the inhibitory powers of vascular tone, resulting in acute inflammation of the membranes of the nasopharynx, and often infection of hitherto normal, or an increase of the purulent secretion of the chronically infected sinuses, with extension of the inflammation through the eustachian tube and tympanic cav-

ity to your mastoid wound, then the vicious circle is complete.

The chief cause for the delayed healing of our mastoid cases has been overcrowding. To crowd over fifty patients where there should be only thirty-two, thereby reducing the floor space per patient by more than forty per cent, and the cubic air space from 1,500, as it should be, to about 600—our present wards allow under normal conditions 812 cubic feet—can have only disastrous results.

As far back as the Crimean war Florence Nightingale found that whereas the mortality among the wounded soldiers housed in crowded barracks was of frightful proportions, no sooner did they transfer them to the open shacks through which the wind and snow had free access than the mortality fell in a most astounding manner.

In spite of improved sanitary conditions and surgical technic, fresh air and plenty of it is just as important today as then, and the opening of windows will not compensate, for unless there is a breeze blowing, the air in a ward can become foul in spite of open windows, especially if the latter are covered with fly screens.

People have fainted in the open for lack of pure air when they were placed in the center of a large crowd when the air was still. Foul air and air borne contagion are two distinct factors, and must not be confused. We know that foul air interferes with the health of the patient and should be corrected.

But a still more important factor relating to the healing of wounds is infection by contact. It is familiar to all of you that experiments have proven that you can have patients suffering from various infectious and some of the contagious diseases and patients with fresh wounds all in one ward, and yet not have cross infection, if you can absolutely prevent your doctors, nurses and orderlies from carrying infection by contact.

The crowding with lack of trained attendants is the weakest link in the chain of surgical work in this, and I presume it is in all the cantonment hospital. On account of the insufficiency of well trained nurses we must rely upon the soldiers for orderlies, many of them being ordinary laborers whose ideas of cleanliness and asepsis are as vague as their knowl-

edge of astronomy. Even intelligent men, if made orderlies, should have a brief course of training before one can expect them to properly handle and care for the sick.

I realize that some of these conditions are unavoidable because of war conditions. Because of these conditions perfect surgical results are often impossible in this type of hospital, and it seems to me we must have two standards of results, one for the perfectly conducted civil hospital and one for military hospitals during war time, for the same men cannot secure the same results under such different conditions, much as they may strive to do so.

For example, in my private hospital, with a highly trained personnel and perfect control of everything that enters into the make-up of the institution, I have during the past six years used the blood clot method in nearly all mastoid cases, with the result that the blood clot has held perfectly in 85 per cent of the radical operations for chronic mastoiditis and 50 per cent of the acute cases, while here (with the exception of the very first cases, when the wards were not crowded) they have practically all broken down, even in the cases where the secretion of the middle ear has entirely ceased, and the wound was covered with firm, healthy granulations. However, I am hoping that with the arrival of good weather and no overcrowding in the wards we shall succeed in securing better results.

Another reason for failure, especially during the inclement weather, has been that when the patients are able to be up and about and can go to the mess hall they are insufficiently clad, as they are not allowed to wear their own clothing until discharged from the hospital, and the hospital clothing is entirely too scanty to guard these susceptible patients against catching cold, with the result that many of them have setbacks, often disastrous.

Of the fifty mastoid cases reported, thirty were presented for inspection and twenty cases were considered in detail.

DISCUSSION OF TABLE OF CASES AND PRESENTATION OF PATIENTS.

1. Acute mastoiditis, simple mastoidectomy. Blood clot, cure. Blood clot held, as conditions were favorable for patients at that time, there being no overcrowding.

2. Thomas—chronic mastoid. Blood clot, which did not break down. No crowding of patients.

3. Wade—chronic mastoiditis, with acute exacerbation. Refused operation for some time. Objected to having radical, which should have been performed. Account syphilitic history, he was given salvarsan, with marked improvement. Whether he will escape radical remains to be seen.

5. Fetherolf—chronic mastoiditis. Extensive destruction. Physical condition very poor. Developed three metastatic abscesses, two subdeltoid, and one gluteal. All promptly opened. Later developed pain in abdomen, with prolonged attacks of vomiting. Became greatly emaciated. Cause not discovered. Steady improvement. Gained twenty-four pounds in one month.

6. Kline—is cured, and has been a ward orderly since six weeks.

7. Moore—mastoiditis developed during pneumonia. Mastoid operation. Condition very poor. Could not give an anesthetic. Mastoid operation made under 150 min. 1 per cent novocain. One deep injection behind auricle and one each over upper and lower part of mastoid. Anesthetic very satisfactory. He developed a buccal abscess (metastatic?) and later abscess of scalp. Twelve and one-half weeks after operation.

8. Berg—radical. Physical condition very poor. Secondary blood clot. Only partially successful. Wound fair.

10. Colquit (col.)—acute mastoiditis. Was operated during attack of pneumonia. Local anesthesia; apothesine 1 per cent, 300 min. injected. Anesthesia not satisfactory.

11. Nickis—chronic mastoiditis. Enormous cholesteatoma. All of mastoid eroded.

12. Burgett—operated for mastoiditis during attack of scarlet fever.

14. Allen—acute mastoiditis with extensive destruction around lateral sinus. Metastatic abscess (gluteal). No streptococci in blood. Had severe chill before operation; temperature, 105. White count day before operating, 19,400. Was greatly emaciated. Gained eight pounds in one week.

15. Douglas—secondary blood clot March 18th.

16. Memoe—acute mastoiditis and arthritis. Operated fifth day.

17. Cerlette—acute mastoiditis. Operated on the tenth day.

Extensive involvement. Temperature 105 at time of operation. Numerous streptococci found in blood before operation. He has had four metastatic abscesses: One subcapsular, two subdeltoid and one sternoclavicular. Has typical fever chart. Had five injections antistreptococcus serum. Last time anaphylaxis after small dose. Last examination of blood showed very few streptococci. He is steadily gaining. Fine appetite. Altogether, we consider him our prize case.

18. Cox—acute mastoiditis. Primary cause probably an acute exacerbation of chronic empyema of ethmoid cells. In fact, I feel positive that in a large percentage of all of our acute mastoids the predisposing cause was a sinusitis, and in the future more study should be devoted to determining by repeated observations, X-ray findings and exploratory punctures, if necessary, the presence or absence of local infection in order to promptly institute treatment or operations of the sinuses, tonsils or teeth—in other words, the ear affection being secondary, we should from the very beginning also go after the primary causes—i e., the infecting foci.

31. Polzzi, John—entered hospital March 9th with high fever and meningeal symptoms. Small high perforation in membrana tympani and scanty secretion left ear. No external evidence of mastoid inflammation. Spinal fluid and blood both contained numerous streptococci. The ear being the only focus of infection that could be found, decided to give patient the benefit of removing the cause. Made radical mastoid operation. Found whole interior of mastoid and tegmen necrosed. Exposed dura freely, and made exploratory incision. Death.

33. March 14th. Cottrel—simple mastoidectomy. Pus had broken through outer plate, forming subperiosteal abscess. Large cells filled with pus. Wound and patient did well until March 19th, when he developed small pneumonic area and was transferred to medical service.

34. Evans—double otitis media. Simple mastoidectomy left side on March 14th. Temperature, 106.5 (rectal) at operation. Fell to normal and remained so for about a week, when inflammation developed in left knee, with moderate rise of temperature. Capt. Sturgis aspirated. Contained mucopurulent fluid. On April 3d it became necessary to make a simple

mastoid operation on the other ear, at which time the knee was aspirated again. Fluid dark and cloudy.

37. Landon—mastoidectomy seventy-two hours after onset of pain in ear. Ears never been affected before. Enormous pneumatic cell in tip of mastoid. Point of interest, all parts of mastoid filled with pinkish colored exudate. A thick walled pinkish sack lined the large tip cell (see drawing).

When one considers that only seventy-two hours had elapsed since first symptoms began, one marvels at the rapid progress. White count was only 8,200.

39. Huesman—double otitis media, purulent, of five days' standing; very profuse. Just recovering from pneumonia; hence made simple mastoidectomy on March 19th under local anesthetic—75 m., 1 per cent novocain. Good anesthesia, but in spite of constant treatment pus is pouring out of both ears, and the question of using vaccine or further operation is to be considered.

Before closing, I again wish to call attention to the fact that in order to keep down the mortality from pachymeningitis, serous meningitis and leptomeningitis, sinus thrombosis and brain abscesses, the aural surgeon must look upon every discharging ear as one that may lead to fatal complications, watch every symptom, and bend all his energies towards preventing further progress, adopt the rule to hunt for pus the moment its presence is suspected, and then promptly drain and remove the cause. In spite of doing this, a certain number will come to a fatal termination, but eternal vigilance brings its reward in greatly reducing the mortality.

II.

STUDIES OF THE EAR AS A MOTION-SENSING ORGAN.

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DUBUQUE, IOWA.

Certain unique features concerning the study of the ear in aviation are worthy of special attention. Since our entrance into the war the Medical Department of the Aviation Service has encountered certain problems of ophthalmologic, cardiovascular, respiratory, psychiatric, and other character. The work of research into the relation between the motion perceiving function of the internal ear and flying, however, had been undertaken long before the entrance of the United States into the war. A group of otologists had conducted experiments and carried on investigations involving the end organs, nerve paths and brain connections of the vestibular portion of the internal ear for a period covering the preceding decade. Many months before the United States entered into the conflict several of this group of otologists had been in correspondence with the Medical Department of the United States Army upon the subject of the physical requirements of applicants for the air fighting forces, and the total available work done upon both sides of the Atlantic was made the basis of the standards adopted for these physical requirements of prospective Army fliers.

Immediately after our entrance into the war the present Air Medical Service was organized. The Chief Surgeon of the Air Medical Service, when he was confronted with the problem of formulating a plan for selecting men for training as fliers for the Army, decided to attempt to limit the admissions into this service to men who were definitely known, as far as was possible to determine by skilled medical examinations, to be possessed of normal physical equipment.

The determination of their possession of all attributes other

than physical fell to another division of the Air Service, the Mental Examining Board, and at no time constituted a part of the work of the Medical Service. The sole duty of the Chief Surgeon with respect to the examination of applicants for flying training was to demonstrate in each man the presence of normal physical equipment.

For the purpose of furnishing a standard plan on which these physical examinations could be conducted upon a uniform basis, blank 609, A. G. O., was formulated, after consultation with the highest medical authorities in the various special fields of medical work covering the complete physical examination of man. The ophthalmologist, the otologist, the rhinolaryngologist, the neurologist, the respiratory and cardiovascular specialist, the gastroenterologist, the orthopedist, the general surgeon, the dermatologist, the genitourinary specialist, are all represented in the constitution of this examination blank, and the general field of complete physical examination covered to the satisfaction of each.

PHYSICAL EXAMINING UNITS.

Special care was exercised to pick the highest grade medical examiners available at each point where it was deemed necessary to establish a Physical Examining Unit, and the work of each unit was departmentalized in the best manner possible to render each examiner capable of serving in his most efficient capacity.

No difficulty was encountered in securing the services of men well trained in all special medical work represented in this blank, with the notable exception of the examination of the internal ear. This was relatively so new that the limited number of those capable of doing this portion of the work rendered it necessary in establishing each Physical Examining Unit, to pay special attention to the selection of the otologist. In many instances it was necessary to develop the man capable of handling this portion of the work by a special intensive course of training and instruction.

Carefully detailed instructions were prepared by high authorities upon the individual medical branches involved in this special examination, and these were sent to each Physical Examining Unit for its guidance; from time to time additional

instructions were issued by the Chief Surgeon for the purpose of further improving the examining service; special visits to Physical Examining Units were made from time to time with a view to maintaining this service at its highest efficiency, and frequent consultation of the best informed medical authorities on the subjects involved were held, in attempts to omit nothing which might improve the quality of this work. Full reference was made to the accumulated experience of the Allies; and confidential and other reports from medical officers in England and France were thoroughly digested and used to shape up the service of the Chief Surgeon's examiners.

IMPORTANT SENSORY EQUIPMENT.

Among the applicant's sensory equipments which were deemed important to demonstrate as normal were visual perception, sound perception, deep sensibility (or muscle-joint-splanchnic or kinesthetic sense), tactile sense, and motion perception; special examination of olfactory, taste, and certain other special senses, such as cold, heat, pain, pleasure, sexual, tickle, hunger, thirst, nausea, and others were not deemed of sufficient military importance to warrant special scrutiny.

COMPARISON OF GROUND AND AIR SERVICE CONDITIONS—MOTOR COORDINATIONS—BODILY ADJUSTMENTS—IMPORTANCE OF SENSES TO MOTOR ACTS.

The difference between the man on the ground and the man in the air lies in the fact that the former can stand still, the latter cannot. When the flier walks across the field to his plane, all his motor coordinations are concerned with maintaining the proper relation between his body and the element which is supporting its weight, the earth. When he straps himself in the seat before flight he practically straps wings to his body; thenceforth, until the end of his flight, every motor coordination is concerned with maintaining a proper relation with the new element which is supporting his weight, the air. The only means he possesses of adjusting his relation with the new weight supporting element is the plane; while flying, all motor coordinations, whether carefully calculated or instinctively performed, are concerned exclusively with controlling the plane. The promptness and efficiency with which motor

coordinations are performed depend directly upon the acuteness of sensory perceptions.

MOTION INDISPENSABLE TO FLYING—SPECIAL IMPORTANCE OF
MOTION SENSING—INTEGRAL ELEMENTS IN
MOTION SENSING.

Rising in the air in an aeroplane is made possible only by rapid motion. Acuity of motion perception assumes much greater importance to the flier than to the pedestrian, and in order to appreciate the full importance of this, one must have a clear conception of the component senses going to make up motion perception. Muscle-and-joint sense, splanchnic, visceral sense, kinesthetic sense—all grouped for convenience under the term "deep sensibility," vestibular sense, vision and tactile sense—each participates in the composite of general motion perception.

• DEEP SENSIBILITY ON THE GROUND COMPARED WITH IN
AIRPLANE.

The motion sensing of deep sensibility on the ground is practically exclusively concerned with sensing the effect of the pull of gravity upon the body; in the air it is also concerned with sensing the effect upon the body of two other pulls, that of the plane's propeller and that of centrifugal force on curves. Impulses generated by these three pulls coming in via the deep sensibility tract must undergo accurate analysis in the brain and be properly estimated and labeled, if confusion and misinterpretation are to be avoided. While such analysis is accomplished by normal individuals, it is only at the expense of a certain amount of the more accurate sensing of the pull of gravity. Whereas, on the ground practically 100 per cent of this incoming information expresses gravity pull, a less percentage of gravity pull is expressed by it in the air.

VISION ON THE GROUND COMPARED WITH IN THE AIR.

Vision, possibly the most important of all motion perceiving senses on the ground, suffers some impairment of its usefulness in the air by reason of the reduction in the number of visible elements in the new environment, such as the usual objects making up the landscape. When darkness or cloud

further reduces the utility of vision, this sense becomes almost eliminated as a source of guiding information to the flier.

TACTILE SENSE RELATIVELY UNIMPORTANT.

Tactile sense contributes less than any of the other three senses to motion perception on the ground; to the flier, although insulated by warm clothing, goggles, gauntlets and helmet, it is still of value as a source of guiding information.

VESTIBULAR SENSE, ITS MOTION SENSING UTILITY AS GREAT IN THE AIR AS ON THE GROUND.

Vestibular sense suffers no depreciation in utility in the air as compared with on the ground. Its sole function has always been, and continues unaltered in any way to be, pure sensing of motion. In flying, therefore, its function assumes a relatively greater importance than that of the other special senses cooperating with it to furnish the individual with his composite knowledge concerning motion.

In view of the foregoing, it is apparent that, in flying, motion takes on a much greater importance as regards potential safety or disaster for the individual than it possesses on the ground, and that motion perception is commensurately of greater importance in the air than on the ground.

Regardless of the actual percentages which would express the shares of vision, deep sensibility, vestibular and tactile sense in the total of motion sensing on the ground, it is established that three of these four are reduced in efficiency by conditions incidental to flying, and the fourth, vestibular sense, is not so reduced, and is therefore of relatively increased importance. It follows that it is of prime importance to determine that men to be trained as fliers possess normal vestibular apparatus. So important is it for the flier to possess normal vestibular acuity of motion perception that no man should be permitted to begin training as a pilot who has not definitely shown normal reactions to vestibular tests.

VESTIBULAR FUNCTION STANDARD REQUIREMENTS.

The entire vestibular apparatus was tested as carefully and as accurately as the state of our knowledge concerning it permitted. It was decided to reject applicants whose vestibular

apparatus gave evidence of motion sensing acuity below a certain degree, albeit it was fully realized, in establishing this limit, that it in no way represented a line of demarkation between acuities of this perception compatible with and incompatible with flying.

POSSIBILITIES OF GREATER LATITUDE REALIZED.

It was fully realized by the Chief Surgeon and his staff that it is possible for a man to fly with a vision of 20/40 or 20/60, or with a talipes, or with a hearing of 5/40. The decision was arbitrarily made, however, that no man would be accepted for flying training by the Army except those with 20/20 vision, absence of gross malformations, 40/40 hearing, and acuity of vestibular motion perception as represented by a minimum of sixteen seconds' nystagmus and normal past pointing and falling responses to standard stimulation.

STIMULATION OF END ORGANS—RESULTS SENSORY, MOTOR—VERTIGO—KIND OF MOTION USED AS STIMULUS.

The motion perceiving apparatus of the internal ear is subjected to stimulation by motion of certain standard quantity and quality, and the results are observed according to uniform standard methods. Two results are noted—a sensory result, the subjective sensation of motion, and a motor result, involuntary movement of the eyes. When the subjective sensation of motion is in accord with fact, we call it normal sensing of motion; when it is not in accord with fact, we call it "vertigo." The only difference between normal perception and vertigo lies in the sensing of motion being in accord with or contrary to fact. The most practical means of applying motion stimulus is by the rotating chair, inasmuch as the application of motion in a linear direction, for the period of time and in the intensity necessary to elicit certain standard responses to that stimulus would necessitate apparatus entirely too bulky to be susceptible of practical application under ordinary conditions of office examination. By making use of a rotational motion stimulus instead of a linear motion stimulus it was possible to work out a standard means of applying motion stimulus in certain definite quality and quantity in a manner and by means of an apparatus easily handled in an office. For this reason

only the subject of the tests of the vestibular apparatus is made to experience rotational vertigo. An additional advantage in using the rotating chair is that it applies motion stimulus of a character to produce a more enduring stimulation of the end organs of the semicircular canals.

Motion in a linear direction applied to a fluid contained in a closed semicircular canal is physically incapable of setting up a flow of that fluid, just as rotational motion applied to a fluid contained in a straight canal cannot set up a flow.

NYSTAGMUS.

Ewald's experiment long ago determined that involuntary pulling of the eyes in a certain definite direction and plane occurs during the time the fluid in a normal semicircular canal is made to flow in one direction; and during the time this fluid is made to flow in the opposite direction involuntary pulling of the eyes in the opposite direction occurs. By applying rotational motion it is possible to reproduce Ewald's experiment in effect, as a test of eye reactions to vestibular stimulation; and when the character and intensity of rotational stimulus is standardized, comparisons of the results can be made and a normal eye reaction determined. This motor expression of motion stimulation is nystagmus.

MEASURING VERTIGO—VOLUNTARY TESTIMONY—INVOLUNTARY TESTIMONY—TECHNIC—POINTING TEST—STANDARD TECHNIC OF POINTING TESTS.

The normal man experiences a sensation of vertigo for between fifteen and forty seconds after being turned according to standard technic. Evidence of this subjective sensation may be had by voluntary or involuntary testimony; voluntary testimony, such as "I'm turning to the right," "I'm still turning to the right," etc., during the persistence of the subjective sensation; involuntary testimony, such as pointing test and falling. Standard tests make use of involuntary testimony in all cases; occasionally this is amplified by voluntary testimony with advantage. In observing the pointing before turning, a very important element in the test can be injected by implanting in the mind of the applicant the definite idea that he is to attempt to determine the location in space of the observer's

finger solely by registering in his memory the location of it according to his tactile sense. This can be augmented by having him touch the observer's finger in more than one position, as, for instance, directly in front of the right hand, come back and touch; then locate again thirty degrees outward and come back and touch; the same procedure in front of the left hand. This implants in his mind the fundamental idea of being able to orientate himself solely by means of information coming from his tactile end organs. After standard rotation to the right, for example, normal man experiences a certain very definite vertigo, a subjective sensation of turning to the left in the same plane as the rotation for a normal period of time. If the pointing test is carried out during this period of vertigo, instead of succeeding in pointing accurately to the testing finger he executes the pointing in accordance with his subjective sensation of motion. Feeling that he is turning definitely away from the testing finger to the left, for example, he reaches for it to the right. This is normal past-pointing.

INSULATION OF SUBJECT.

The insulation of the applicant during this test should be as perfect as possible. A black domino mask should be used, absolute quiet should be maintained, olfactory impressions should be shunted out, and he should be left as solely as possible dependent upon the information brought to him along the vestibular tract alone.

SIGNALING SUBJECT—OBVIATING SEARCH MOVEMENTS—OBSERVING PAST-POINTING—HOW TO CONSTRUCT COMPENSATORY POINTING.

The applicant should be definitely instructed before turning that he should not expect a verbal order to touch the observer's finger, raise his hand and come back, and attempt to find it after the turning; he should be practiced before turning in executing his touch, raising his hand, and coming back to find the finger upon receipt of the signal from the observer's finger as it comes into the position which it maintains during the test—the observer bringing up his finger into position so as to tap the applicant's finger as a signal for him to execute his pointing without verbal command. It is very important for

the applicant's finger to find a finger of the observer when he comes down in search of the finger which is testing him. Otherwise, there is injected into his mind a disconcerting element of dissatisfaction in having failed to find the finger for which he was searching. For this purpose the index finger of the observer's left hand can be held in readiness to furnish the touch necessary to shunt out this sense of failure. In observing the past-pointing after rotation, the observer's right index finger should be definitely fixed against the observer's hip so that visual attention to it on the part of the observer can be dispensed with, the hip rest insuring its remaining definitely where it was when the applicant first touched it in making the pointing test. The observer's eyes can be free to watch the applicant's finger at the top of the swing. Past-pointing at the top of the swing is just as definitely normal past-pointing as at the completion of return to touch. Many cases compensate after evincing a normal tendency, let us say, to past-point outward with the right hand when they should do so, and subsequently execute a compensatory touch or inward pointing at the bottom of the return. In such cases the pointing should be registered as that executed at the top of the swing, which is the primary and clean response before it has been altered by the subconscious or conscious compensation effected by other mental processes. Visual attention on the part of the observer to the applicant's hand at the beginning of his downward pointing is of enormous importance and it should be very carefully observed as part of the standard technic.

FALL TEST.

The fall test is similar. A normal man, on attempting to sit upright after leaning forward during right rotation, feels that he is turning to the left, for instance, and so gives involuntary expression to this sensation by falling to the right on attempting to assume an erect sitting posture.

These tests can be completed in less than five minutes. Incidentally, these tests are in no sense severe and are in fact seldom regarded even as unpleasant.

Occasionally nausea occurs after these turnings; it is then merely necessary to stop the examination for the time being

and to complete the remainder of the tests after an interval of a half hour. There is no need whatever to make tests in any way distressing to the candidate.

OBVIOUSLY UNFIT CASES—BORDERLINE CASES—CALORIC TEST—
DETAILS—ALLOWABLE LATITUDE—DRUMHEAD INSPECTION.

With respect to the internal ear motion sensing apparatus, its nerve paths and brain connections, these turning tests quickly separate the obviously fit from the unfit. The majority of the candidates show normal responses; no further testing is required, and they therefore qualify and are accepted. Some candidates show such markedly subnormal responses that they are immediately disqualified and rejected. A limited number give what might be termed "borderline" responses; the question then arises, Has this particular applicant sufficient motion sense to become an aviator? It is here that the caloric test is useful. The turning has tested both the right and left ears simultaneously. The caloric method enables us to test each ear separately. Water at 68 degrees F. is allowed to run into the external auditory canal from a height of about three feet through a stop nozzle, with the head tilted 30 degrees forward, until the eyes are seen to jerk and the individual becomes dizzy. The length of time from the beginning of the douching until the jerking of the eyes becomes apparent, or until the applicant says he is dizzy, is accurately measured by a stop-watch. The type of nystagmus is then noted. With head in upright position, it should be rotary, and the direction of the jerk should be to the side opposite the ear douched. The length of the douching shown by the stop-watch in the normal is 40 seconds. The eyes are then closed and the past-pointing is taken. The head is then immediately inclined backward 60 degrees from the perpendicular (or 90 degrees from the original position). There should then appear a horizontal nystagmus to the side opposite to the ear douched. The eyes are then closed, and the past-pointing is taken with the head in this position. The left ear is then douched and the same procedure carried out. If the caloric test applied to one of these "borderline" cases shows only a slight impairment of the responses from each ear, the candidate is qualified. If instead of 40 seconds of

douching, there was required not more than 90 seconds of douching to elicit normal responses, the applicant is not rejected. Care should be taken to be certain that the cold water is reaching the drumhead during this caloric test, as wax or other obstruction in the external canal would interfere with the responses in a perfectly normal individual.

After carefully considering the foregoing, the neurologist and the general diagnostician cannot fail to be struck with the comprehensive character of these vestibular tests, for frequently they are looked upon as ear tests only. Six months ago one of the greatest otologists of Europe, in discussing these tests, raised the question as to the necessity or advisability of including in aviation examinations the past-pointing and falling tests, his contention being that in testing nystagmus only, one secures definite evidence of the functional state of the semicircular canal end organs of the internal ear. When his attention was drawn to the fact that in testing the past-pointing and falling in addition to the nystagmus one establishes definitely the functional intactness, (1) of the various afferent paths and the intracranial structures through which they pass, (2) of the cerebral cortical centers and their transcortical association tracts, (3) the efferent cerebral paths and the nuclei through which they pass, (4) the cerebellar nuclei and correlation paths to and from cerebellar cortical centers, (5) various portions of pons and medulla oblongata, his attitude was completely changed and he became a firm advocate of the complete testing of nystagmus, past-pointing and falling as a routine procedure.

It cannot be emphasized too strongly that the vestibular tests are not only ear tests; in addition they actually test very extensively a large portion of the central nervous system.

Certain infectious diseases are known to manifest a predilection to attack the vestibular apparatus. Acute toxic end organ disease and neuritis of the eighth nerve are well recognized complications of mumps, typhoid and some of the commoner epidemic infections; syphilis is particularly prone to attack the eighth nerve. Permanent impairment of function of the vestibular apparatus in varying degrees ensues upon any such attack. It therefore becomes necessary to reexamine fliers at regular intervals in order to make certain that no

functional deterioration of the vestibular apparatus has taken place. Regular examinations should be made at intervals of about eight weeks. Special examination should be made at once of any flier who manifests unusual failure to negotiate air maneuvers with ordinary skill.

One of the foremost otologic problems constantly before the chief of the Air Medical Service has been how much leeway can safely be allowed in standard tests of vestibular functions and acuity of perception. As has been mentioned before, all motor coordinations made by the flier during flight, whether carefully planned and consciously performed or instinctively and subconsciously executed, have only one ultimate expression, namely, the determining of his relations with respect to his environment and with respect to the new element which is supporting his weight, the air. Either instinctive action or carefully considered intentional action upon the part of the flier is determined entirely by information which is coming into his possession concerning his relations with his environment. This information can be had by him only through the activities of his special senses. But possession of normal perceptive end organs, nerve paths and brain connections does not constitute definite assurance that the individual will accomplish satisfactorily balance or orientation. Further, he may accomplish balance satisfactorily and still be completely disorientated; or he may be properly orientated and fail to accomplish balance properly. The two are independent functions of the mind, closely associated, but in no way functionally interdependent. On the other hand, lack of normal perceptive apparatus does constitute definite assurance that the individual will be physically less able to accomplish balance or orientation, or both, under certain circumstances under which these would be possible for the man in full possession of normal perceptive apparatus. There are certain circumstances under which balancing can be performed adequately even by the man who is possessed of less than full normal equipment. There is no doubt that man can accomplish a certain kind of flying blindfolded, or without functioning vestibular apparatus, or without normal deep sensibility. Hence this important air medical problem is to study the "peak load" requirements, the conditions of emergency and confusion

which may be encountered unexpectedly in the air, and to attempt to estimate carefully the minimum perceptive equipment which would be adequate under these conditions to enable the flier to negotiate such difficult and unusual phases of flying. There are certain temperaments, certain types of minds, certain intangibly different mental composites, which determine the inability of the individual to negotiate these critical points in flying, even though he be in full possession of his sensory perceptive facilities. "Self possession," "coolness," "bravery," "sand," "presence of mind," "judgment," on the other hand, added to a perceptive equipment of less than normal, may determine the success of an individual in emerging safely from a critical air situation. While this is unquestionably the fact, these mental qualities are so intangible, so indeterminable, and, above all, so distinctly not in the category of things physically to be examined and measured by the medical examiner that it is not deemed justifiable for the physical examiner to admit into the Air Service or to allow to remain in the Air Service anyone who is discovered to be lacking in acuity prescribed for the several special senses known to be prime requisites of the flier.

MOTION SENSING EXPERIMENTS IN LINEAR UPWARD AND DOWN-
WARD DIRECTION—GROUPS TESTED—CONDITION
OF TESTS.

One of the methods of approaching the problem of determining what is the relative value of the various sensory contributions to the individual's total knowledge concerning motion was a series of experiments performed in a bank of elevators capable of performing vertically upright trips forty stories in extent, a height of over 400 feet, at a maximum speed of 1,000 feet per minute. For this purpose four groups of individuals were selected, namely, (1) normals, (2) deafmutes totally lacking vestibular perception, (3) deafmutes possessing vestibular perceptions in various degrees below the normal, and (4) tabetics whose deep sensibility was impaired to various degrees. These experiments were carried out during a period of six weeks, with a view to determining the average ability of each group to sense the various vertically up and down movements to which they were subjected.

The elevator shafts were entirely dark, and the lights on the cars were shut off during the experiments, so that no information reached the individual via the visual tract. Each individual of the normal group was first determined to be possessed of normal vestibular and deep sensibility.

The following is a digest of the findings:

GROUP 1.

FINDINGS IN NORMALS.

1. Acceleration.—During acceleration upward all were able to sense accurately the character of the motion to which they were subjected.

2. Sustained Speed.—A slower sustained rate of speed immediately ensuing upon acceleration upward was uniformly misinterpreted as arrest of motion or as very slow motion.

3. Retardation.—Retardation to the slowest possible continued speed upward, ensuing upon sustained speed upward, was universally sensed as motion vertically downward.

GROUP 2.

FINDINGS IN DEAD VESTIBULE DEAFMUTES.

4. The deafmutes in whom the vestibular function was totally abrogated sensed acceleration upward correctly.

5. These individuals were uniformly inconsistent in describing the character of slow motion vertically upward at a constant rate of speed, sometimes guessing "upward" and sometimes guessing "downward," but always acutely sensitive to the fact that they were undergoing motion of some kind.

6. Retardation, ensuing upon motion vertically upward at a sustained rate of speed, was uniformly correctly sensed by these individuals.

7. Arrest of motion ensuing upon retardation or motion at a sustained rate of speed was uniformly correctly sensed by these individuals.

8. In these individuals it was impossible to produce the illusion of reversal of motion by alteration in the speed of the car. It was apparent that absence of hearing and vestibular sense had keyed up to a high degree of attention and sensitiveness the deep sensibility tract, though it is not believed

that this observation justifies a statement that the sensing of the deep sensibility impulses was keener than that of the normal individual. It seems certain, however, that the attentions of these individuals to motion perceptions coming in via the deep sensibility tract were more intense than that of the ordinary normal individual.

GROUP 3.

FINDINGS IN LIVE VESTIBULE DEAFMUTES.

9. Deafmutes in possession of intact vestibular apparatus and normal acuity of perception absolutely duplicated the findings of the first group of full normal individuals tested, as shown in items 1, 2 and 3 of this digest of results.

10. Deafmutes in whom acuity of vestibular perception was reduced to an index represented by two or three seconds' duration of nystagmus and no past-pointing and almost absent falling were able to sense acceleration vertically upward correctly and failed to identify slower motion at a sustained rate of speed upward, but sensed the motion very positively, though labeling it at times "motion downward" and at other times "motion upward"; they were able to detect retardation and arrest keenly, but did not experience the illusion of reversal of motion either following acceleration, retardation or arrest of motion.

GROUP 4.

FINDINGS IN TABETICS.

11. Tabetics in whom vestibular tests had demonstrated the presence of normal vestibular functions were roughly of two classes—the lower or dorsolumbosacral type and the higher or the cervicodorsal type. Both types evidenced a satisfactory ability to sense acceleration of motion vertically upward; slower motion at a sustained rate of speed ensuing upon this acceleration upward was not sensed at all by either type; retardation following motion vertically upward at a sustained rate of speed was sensed as motion downward by both types. Particularly striking was the continuation over long periods of time of the sensing of motion downward by the first type of tabetics when arrest of motion ensued upon retardation

vertically upward. Several of these cases continued to indicate motion downward for from thirty to sixty seconds following total arrest of motion. This was not the case with the second type of tabetics, several of whom, however, did indicate sensation of motion downward for a few seconds following total arrest of motion.

DOWNWARD MOTIONS.

12. Acceleration of motion downward from the fortieth floor was correctly sensed by normals, both types of deaf-mutes, and both types of tabetics.

13. Slower motion downward at a sustained rate of speed ensuing upon rapid acceleration downward was sensed by the normals universally, as either complete cessation of motion or extremely slow motion in a downward direction; this was also the case with the second group of deafmutes, those in possession of vestibular functions; the first groups of deafmutes were unable to sense the character of sustained motion downward accurately, but more frequently guessed "downwards" than "upwards"; the tabetic of either type indicated almost invariably arrest of motion.

14. Retardation downward ensuing upon motion at sustained rate of speed downward was sensed as arrest of motion or as slow motion upward by the normal group and by the deafmutes in possession of vestibular function and by both types of tabetics. This confusion of sensing between arrest and slow motion upward was consistent with all members of these groups, but individuals in each group varied in their answers, one individual sometimes indicating arrest and at other times indicating slow motion upward.

15. Arrest of motion ensuing upon retardation downward was uniformly indicated as slow motion upward by the group of normals; the group of deafmutes in possession of vestibular function sensed this as slow motion upward only for a second or two and then indicated properly total arrest of motion; the group of deafmutes totally lacking vestibular perception uniformly indicated correct perception of arrest of motion on the instant; both types of tabetics indicated sensation of motion vertically upward, and this sensation continued for a much longer period of time than in the normal group.

The conclusions from the above outlined experiments are that (a) the normal individual, the deafmute whose vestibular function is unimpaired, and the tabetics whose vestibular functions are unimpaired seem to be almost equally sensitive to acceleration either upward or downward; (b) during slower motion at a sustained rate of speed upward or downward the deafmute whose vestibular function has been totally abrogated is totally unable to sense accurately the character of the motion to which he is subjected, but he is keenly sensible of being subjected to some kind of motion; whether this is vertically upward or vertically downward seems to be pure guesswork. The other individuals tested all evidenced sensory illusion and always in the shape of a relative reversal varying in degree between a sense of partial or complete arrest of motion and inception of motion in the opposite direction. This latter was more marked in the tabetic. This would seem to indicate that in general the quantitative perception of motion at a sustained rate of speed lies more particularly within the province of the deep sensibilities; the qualitative perception—that is, determination of the exact direction of the motion—lies within the province of the vestibular component in the total composite of motion perceiving. (c) Susceptibility to illusion of a motion perceiving naturally is directly proportionate to the keenness of the ability to make accurate qualitative perceptions; in other words, the illusions of motion in the absence of vision are largely, if not exclusively, attributable to the vestibular apparatus.

It should be added that for the purpose of conducting these experiments especial control was added to the regular control of these elevators, and by means of this the accelerations, retardations, and motions at sustained rates of speed were accomplished with almost complete absence of jarring or friction. The use of magnetic brake control adjusted to extreme nicety and the elimination of all loose connections and joints eliminated sound almost completely; the visual element of motion sensing was absolutely eliminated by the conducting of the tests in perfect darkness; tactile impulses were almost completely eliminated by lining the entire car with thick blankets, protecting the subjects from access of air currents to the skin throughout the experiments.

RÉSUMÉ.

General condition of aviator's ears, nose and throat must be good.

The ground soldier can stand still. The aviator cannot.

Motion sensing, therefore, assumes great additional importance to the aviator.

Of the senses concerned in motion sensing, the vestibular sense is the only one whose utility remains constant; hence the necessity of determining the aviator's possession of requisite vestibular sense.

Vestibular tests not only determine functional condition of this portion of the internal ear but give definite information concerning the integrity of parts of the medulla oblongata, pons, cerebrum, and particularly the cerebellum.

Observations made in an extensive series of blindfold experiments on normal persons, on persons with nonfunctionating vestibular apparatus, on persons lacking hearing only, and on persons with impaired deep sensibilities indicate that perception of motion in a linear direction—

(a) During acceleration, is sensed most accurately by those whose vestibular apparatus is functioning;

(b) At a sustained rate of speed is sensed accurately by each group except those lacking deep sensibility;

(c) During retardation is sensed accurately by those whose vestibular apparatus is functioning;

(d) Arrest of motion ensuing upon motion in a linear direction is most accurately detected by the group lacking vestibular function but in possession of unimpaired deep sensibilities.

Special ability to estimate correctly the degree of falsity of oft repeated motion sensing illusions may be developed in normal persons through experience and education. This special ability enables its possessor to maintain safe bodily relation with his environment during the existence of the motion sensing illusions with which he has become familiar through long experience.

A superficial observation might suggest that possibly the safest aviators would be those lacking vestibular function, such as deafmutes, inasmuch as they are incapable of developing motion sensing illusions which, in normal persons, ensue

upon spinning nose dives or other whirling aeroplane maneuvers. Possession of normal functioning sensory end organs always entails the possibilities of subjective sensory illusions, but to argue the advantage of lacking such special sense end organs is, naturally, to reach the *reductio ad absurdum*.

III.

REPORT OF A CASE OF SPONTANEOUS HEMORRHAGE FROM THE LATERAL SINUS OCCURRING SIX DAYS AFTER SIMPLE MASTOID OPERATION.

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The clinical picture of lateral sinus thrombosis is too well known to require description, but this case showed one rather unusual feature—that of spontaneous hemorrhage occurring after simple mastoid operation, and subsequent hemorrhages after ligation.

The patient was admitted to the hospital April 20, 1918, complaining of pain in the right ear. Age, twenty-one years; previous occupation, railroad brakeman. Family history negative. Past history: Mumps, measles and whooping cough in childhood; no previous ear trouble. Present history: Had been having severe pain in the right ear for the past two days following a severe "cold," some headache and malaise. Physical examination showed a well developed and well nourished young man weighing about 180 pounds. Findings were negative; throat, heart and lungs normal. Urine examination negative.

Otoscopic examination showed on the right a normal canal with the membrana tympani red and bulging. No mastoid edema but quite tender over the tip of the mastoid process. The left ear was negative. Examination of the nose showed a fairly straight and nonobstructive septum. Examination of the throat showed moderate sized tonsils with no evidence of disease. No adenoids.

Free incision of the membrana tympani under local anesthesia immediately was performed. Following this there was a serosanguinous discharge from the middle ear and relief of pain. Temperature on admission was 101.8. Tenderness

over mastoid persisted in decreasing degree for two days and then subsided. Next day after his admission his temperature was normal. The discharge gradually changed in character to thin purulent and became less in amount. The middle ear process apparently subsided and the membrana tympani began to resume normal color.

On the eighth the middle ear was only slightly moist, and normal landmarks began to be seen. On the tenth day the ear was dry. On the twelfth day temperature became elevated to 103 in the morning and 104 in the afternoon. The ear apparently was convalescing. Examination of the throat showed follicular tonsillitis, the tonsils being reddened and showing follicular exudate. Temperature was lower the next day, and on the fourteenth day it was normal. The throat still remained inflamed until the eighteenth day after his admission while the ears were negative. It was considered that his temperature was due to his tonsillitis.

On the nineteenth day the patient complained again of pain in the right ear, and examination showed the membrana tympani red and bulging. Temperature was 102.4. The membrana tympani was freely incised under local anesthesia with a relief of pain and resulting thin purulent discharge. The canal was negative, and there was no mastoid tenderness or edema. The next morning the patient's temperature was normal. As the ward was in quarantine at this time because of a case of scarlet fever, it was impossible to have a radiograph examination.

On the afternoon of May 10th, twenty days after the original onset of otitis media, the patient had a temperature of 103. The ear was discharging freely. There was no mastoid tenderness or edema, but considerable preauricular swelling. This appeared at first to involve the parotid gland. Following consultation with the medical service, the patient was put under observation for mumps. Next day his temperature dropped to 100. On May 12th, discharge from middle ear was quite profuse and the superior canal wall showed a distinct flattening. The membrana tympani was red, swollen and boggy. The mastoid periostium felt somewhat thickened and there was slight tenderness over the tip. The preauricular swelling remained the same. Temperature, 102.2. Diagnosis

of acute mastoiditis was made and simple mastoid operation was immediately performed under ether anesthesia.

Usual incision—cortex exposed and found to be bleeding. There was a large pneumonic mastoid with cells broken down and containing free pus. There was a considerable number of zygomatic cells. Antrum was opened and mastoid completely cleaned out. The sinus was exposed over its upper part and found covered with granulations. Light pressure with the back of the curette upon these caused a small spurt of pus through the thin but apparently solid plate of bone covering the sinus below. The granulations were not disturbed. The sinus was uncovered well below the digastric fossa. One strip of iodoform gauze was inserted with end in antrum and wound partially closed with silkworm gut.

The next day, May 13th, the temperature was 101 and the patient felt fine. Wound was clean and there was but slight discharge from the middle ear. Temperature remained normal for the next two days. The wound was clean and the middle ear almost dry.

May 16th, four days after the operation, the patient had a chill, following which the temperature went to 104. The packing was removed from the mastoid, and the sinus seemed to be pulsating, with a very slight discharge from the middle ear. White blood count, 6,400; differential; polymorphonuclear, 93; small mononuclear, 3; large mononuclear, 2; transitional, 2. Blood culture showed no growth for forty-eight hours. That evening, temperature was 103. The next day, May 17th, the patient seemed better. The middle ear was dry; there were no chills. Temperature that evening, 102. White blood count, 9,600; differential; polymorphonuclear, 72; small mononuclear, 11; large mononuclear, 15; transitional, 2.

On the morning of May 18th, temperature was normal and the patient felt fine. At 4:00 p. m., six days after the operation, the patient had a spontaneous hemorrhage from the lateral sinus, apparently from the upper portion, that part seen covered with granulations at operation. The hemorrhage was controlled by packing under aseptic conditions. There were no chills. Temperature that evening was 101.6. The next day, May 19th, the patient looked rather septic. Temperature,

100 in the morning, 104.4 in the afternoon. White blood count, 16,800; differential; polymorphonuclear, 72; small mononuclear, 11; large mononuclear, 7.

On May 20th, the patient had a second chill, following which temperature went to 103. White blood count, 13,000; differential; polymorphonuclear, 85; small mononuclear, 5; large mononuclear, 10. The patient was seen in consultation with Major Harris, and it was deemed advisable to ligate the internal jugular vein. The operation was immediately performed under ether anesthesia. A one inch horizontal incision in the crease of the neck at level of the thyroid was made—dissection with Mayo scissors, vertically along anterior border of sternomastoid muscle—carotid sheath found and internal jugular vein exposed and ligated with two chromic catgut sutures. Wound closed with one buried catgut suture, the skin with silkworm gut. Mastoid reopened. Sinus incised and, despite attempt to block off, it was impossible to remove portion of the lateral wall because of profuse bleeding. No obliterating thrombosis was found. The sinus was packed with gauze plug and wound closed. Temperature that night, 102.

The patient reacted well from operation and seemed to be in good condition the next day; temperature, 102. White blood count, 13,400; differential; polymorphonuclear, 75; small mononuclear, 18; large mononuclear, 7. Blood culture still showed no growth.

On May 22d, the patient's temperature was 102. There was some nausea and vomiting, not projectile in character; pupils equal and reacted to light and distance; reflexes were all negative. The middle ear was dry. The packing was removed from the sinus without bleeding. This was reopened with a sterile probe and bleeding ensued. White blood count, 10,200; differential; polymorphonuclear, 85; small mononuclear, 9; large mononuclear, 6. The patient was put on temperature baths and colonic irrigations. There was no spontaneous nystagmus and hearing was still preserved in ear. The next day he had a chill, following which his temperature went to 104.4. There was no nausea or vomiting. The middle ear was dry. Medical consultation showed "myocardial element somewhat impaired, no acute condition found." Neck was swollen and somewhat indurated about wound, although this

was apparently healing nicely. This was reopened, sutures removed and neck explored under cocaine anesthesia. About two ounces of pus was evacuated from under the sternomastoid muscle. The wound was flushed out and light drain inserted. This was apparently due to infection from the buried catgut suture. The next day, May 24th, the patient was feeling better, middle ear was dry and the packing was removed from the mastoid wound. Temperature, in the morning, 101.8; afternoon, 103.2, rectal.

On May 25th, the patient had another chill, following which temperature went to 104.4, rectal. Blood culture showed growth of streptococcus hemolyticus; 125,000,000 units of mixed streptococcus vaccine were given. May 26th, the patient complained of pain in the right shoulder joint. Nothing was evident on examination. Temperature, morning, 100; afternoon, 103, rectal. May 27th, the shoulder was still painful. There was some coughing, but nothing pathologic was found in the chest. Slight serous discharge from neck wound. There was another spontaneous hemorrhage from the sinus, easily controlled by a plug of gauze. Temperature, morning, 102.8; afternoon, 104.2, rectal.

May 28th medical examination showed "pleuropericardial friction with thickened pleura extending above the sixth rib; evidence of effusion." Temperature, morning, 101.6; afternoon, 104.4, rectal.

May 29th, shoulder still painful. Packing was removed from the sinus and a light wick inserted. May 30th, 200,000,000 units of autogenous vaccine were given. He seemed somewhat improved.

May 31st, temperature, morning, 100; afternoon, 103.

June 2d, general condition seemed improved. There was slight discharge from the neck wound. The mastoid wound was clean. Ten minutes after dressing there was a hemorrhage from the sinus. This was examined and found to be a slow bleeding from the anterior portion, easily controlled by light packing.

June 3d, general condition somewhat better; temperature, morning, 99.6; afternoon, 102. Three hundred million units of autogenous vaccine given. June 4th, packing was removed from the mastoid. June 6th, right shoulder joint still sore

and painful. Surgical consultation and aspiration was advised. Eight cubic centimeters of serosanguinous fluid was obtained. No growth on culture. He continued gradually improving for the next eight days, with temperature below 100, rectal. June 13th, he was up in a chair. June 14th, temperature rose to 102 and fluctuated between 101 and 103 for the next three days. Medical examination showed thickened pleura on the left, from base to the sixth rib in axillary line; heart fairly well compensated; white blood count, 16,200.

June 16th, fundi examined by Lieut. Col. de Schweinitz: "Right disc swollen 2.5 D., hemorrhage above disc. Left disc swollen 3.5 D., no hemorrhage. No optic neuritis. Reflexes all negative."

June 17th, spinal puncture performed; fluid clear, normal pressure, cells 2 per centimeter. No growth on culture. Neurologic examination by Major Ney: "Reflexes normal, no paralyses, sensations normal, cranial nerves negative, no evidence of increased intercranial pressure, no focal symptoms."

June 18th, temperature normal. Fundi examined by Lieut. Col. de Schweinitz: "Right disc swollen 3.5 D., no change in hemorrhage. Left disc swollen 3.5 D., temporal edge of disc visible, probably toxic condition."

June 20th, fundi showed no change. Blood pressure, systolic, 126; diastolic, 84. Mastoid wound was clean and neck wound about healed.

June 23d, examination of fundi showed both discs swollen 2 D. Some improvement in hemorrhage in the right. From this time on there was continued improvement. The patient was up and about the ward.

July 4th, examination of fundi showed right outline of disc distinct along entire temporal side, much improved and almost normal, no sign of hemorrhage. Left same as right.

July 8th, vision was tested: right 20/30, left 20/30. The neck wound was healed and the mastoid almost so. The shoulder still showed some limitation of motion and smaller in size than the left. This was put under the care of the Orthopedic Department and gradually improved. The mastoid wound rapidly healed. The neck wound showed a small linear scar, not easily discernible; hearing was 20/20. He was

discharged by the Orthopedic Department as cured, August 24th.

COMMENT.

In this case apparently we had to deal with first a very acute suppurative otitis media, the virulence of the infection being shown by the temperature on admission, amount of pain and early tenderness over the tip of the mastoid. Associated with this was undoubtedly more or less involvement of the mastoid, which was unrecognized at the time. Under appropriate treatment this subsided, and we had apparently a convalescent middle ear and an arrested if not healing mastoiditis. Then we had the advent of acute follicular tonsillitis, which was due to the same or to an added organism, and the streptococcic torch applied to the waiting bonfire in the middle ear and mastoid resulting in acute exacerbation, made manifest after nine days of apparent convalescence.

Progress was rapid and we soon had in four days a manifest mastoiditis presenting a drooping of the superior canal wall, thickened mastoid periostium and the preauricular swelling already spoken of. Operation disclosed extensive destruction and perisinus abscess. The temperature of 103 on May 10th was probably the beginning of invasion of the sinus wall.

Four days after operation, we had the first real manifestation of sinus involvement with a chill and rise in temperature of 104. This probably marked the initial bacterial invasion of the blood stream. Two days later came the first spontaneous hemorrhage from the sinus, due to necrosis of the vessel wall, and two days later we had the second chill, considered by some as the final indication of operative interference. Ligation was then performed, but we already had our septicemia manifested by subsequent septic temperature and the metastatic process in the right shoulder. The attempt to demonstrate, much less remove the thrombosis was unsuccessful, though undoubtedly a parietal thrombosis was present. We were not able to get the blood bacteria free, but had a septicemia, with a metastatic process in the right shoulder joint and probably in the left pleural cavity.

Because of the necrosis of the sinus wall, manifested by sub-

sequent hemorrhage, it was impossible to block off the sinus above and below, to remove a part of the lateral wall and obliterate it by compression. This resulted in a retention of the focus of infection within the vessel. Further necrosis of the wall took place, together with breaking down of the clot, and subsequent hemorrhages ensued. The sinus was not obliterated at that time. Indeed, it is a question as to when the sinus is obliterated backward to the torcular after operation.

Some time ago I operated upon a mastoid which had had a previous mastoid with ligation of the internal jugular and removal of a thrombus from the lateral sinus two years before, and I found the sinus completely obliterated, its location being evidenced only by a fibrous thickening of the dura.

The fundus changes were probably toxic, as Lieut. Col. de Schweinitz pointed out.

The patients' septicemia was limited by the ligation, tardy as it was, and his resistance enabled him to weather the infection.

This case seems to bear out the generally accepted opinion that thrombosis of the lateral sinus is due to necrosis of intima of the vessel wall. This may be manifested by hemorrhage from the sinus. Therefore, it would seem decidedly indicated in a case showing this sign to operate immediately rather than waiting for the classical two chills and septic rise of temperature.

IV.

COMPLICATIONS AND SEQUELÆ OF TONSIL AND ADENOID OPERATIONS: THEIR PREVENTION AND MANAGEMENT.*

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Although often regarded lightly by the laity and all too frequently so treated by the profession, it has been my observation that numerous complications may arise from tonsil and adenoid operations, and many such references may be found in the literature. It is true that the vast majority are not fatal, and it is also probable that the actual percentage is not high; but when we come to enumerate these complications and to consider that many have doubtless never been reported, it must appeal to us that the subject is one to which a great deal of interest should attach.

Hemorrhage.—Undoubtedly the most frequent untoward occurrence in the course of these operations is bleeding. How many cases would become serious if not interfered with it is impossible to say; but there are few men doing this work who do not feel called upon to control the loss of blood very frequently. Not only does it conserve the strength and vitality of the patient, but it also diminishes the postoperative nausea by preventing the swallowing of blood.

Predisposing causes should be ruled out previous to operation. High blood pressure and arteriosclerosis must be anticipated, as also should certain systemic diseases, such as the anemias, leukemias and choletrias. Hemophilia, though rare, is occasionally met with and may be easily overlooked, as the subjects are usually robust and healthy looking. This mistake should be guarded against by a careful history in every case and by taking the coagulation time of the blood if there is occasion for the slightest suspicion. It is generally

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conceded that the coagulation time is not conclusive evidence as to whether a given case will bleed seriously or not, but it is of value in reaching a decision in questionable cases, particularly in the blood dyscrasias and cholemia. In hemophilia the history, both family and personal, is of paramount importance.

In dealing with this type of case following operation, mechanical means having proven useless, transfusion is the procedure of choice to combat the condition. In its stead the use of normal serum, antitoxin or one of the several proprietary preparations may be tried. The use of these preparations or of emetin or pituitrin has been advocated as a preliminary to operation in all cases, but I have been unable to convince myself that their routine use is justified or necessary or that they really accomplish the desired result.

However, in the vast majority of cases no systemic condition will be involved, and the question is simply one of mechanical interference. There is no doubt that proper mechanical interference would have controlled most of the fatal cases of postoperative tonsil hemorrhage that have been attributed to hemophilia.

Although a detailed study of the anatomy of the parts is not within the province of this paper, I shall presume to summarize briefly from the literature, so that we may draw certain clinical deductions therefrom. Five vessels contribute to the supply of this region, entering into a free anastomosis about the tonsil, and it is probable that the blood supply is not typical in every case, coming as it does from such varied sources. According to Davis,¹ the main arterial supply comes from an anastomosis outside the fossa itself, contributed to principally by the ascending palatine branch of the facial and the descending palatine branch of the internal maxillary. The resulting vessel enters the fossa at its upper extremity, and, coursing down between the capsule of the tonsil and the aponeurosis of the constrictor, pierces the capsule to enter the substance of the tonsil at about the middle of the fossa, slightly anterior to its center. It is true that this vessel can frequently be seen in the location described after removal of the tonsil, and is often responsible when bleeding occurs. The accompanying vein follows the same course.

The ascending pharyngeal artery supplies the mucous membrane and muscles of the upper part of the pillars of the fauces and the soft palate, by its pharyngeal branches, which also supply the superior constrictor muscle.

The tonsillar branch of the facial and the dorsalis linguæ branch of the lingual supply the plica and mucous membrane and muscles of the pillars in their lower half or two-thirds, and anastomose freely in this region. According to Fetterolf, branches of these vessels are important in the supply of the tonsil and penetrate the capsule at varying points below the middle. It is certain that bleeding is often encountered low down near the base of the tongue after removal of the tonsil, and probably comes from some of these branches which have either been cut in the dissection or severed at their entrance into the tonsil, upon its removal. Venous drainage in the lower part of the fossa is by means of a plexus of veins, the tonsillar plexus, situated external to the capsule of the tonsil between the aponeurosis of the superior constrictor and the muscle itself, and emptying into the pharyngeal plexus. Anomalies occur here as elsewhere, and it is not unusual to find that an abnormally large artery or vein has been severed and to encounter severe bleeding from it.

It is also well to keep in mind the fact, as mentioned by Makuen,² that the portion of the intrapharyngeal aponeurosis covering the superior constrictor forms at this point the bed of the tonsil and separates it from the muscle. There is a distinct line of cleavage, normally, between the tonsillar capsule, so-called, and the aponeurosis, and after tonsillectomy the intact aponeurosis should be seen lining the fossa. This ideal may not always be possible of attainment, for in many adult throats which have been subject to frequent inflammations or peritonsillar abscess, these fibrous layers are so bound together and to tonsil and muscle that the removal of the tonsil without wounding the aponeurosis is practically impossible. This injury will result in damage to the pharyngeal branches of the ascending pharyngeal artery or to the tonsillar plexus of veins which, being lost in the torn fibers of the muscle, are very difficult to catch in the hemostat. It is, therefore, highly desirable to keep in mind these relations and to avoid, if possible, any damage to the aponeurosis.

With these facts in mind, it appeals to me as being highly desirable to remove the tonsil with the minimum of dissection and by a method that involves the least possible damage to the structures immediately surrounding. This is best done, according to my belief, by the employment of the cold wire, cutting from behind forward, slowly and without preliminary dissection. It is my belief, however, that dissection must be used in some cases in order to accomplish the desired result.

Following the removal of the tonsils, the field should be carefully inspected to ascertain the source of bleeding if any be present. If the bleeding is slight and limited to venous

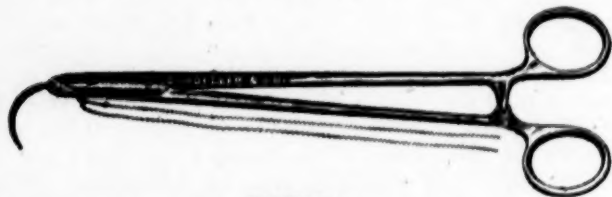


FIGURE 1.

Needle holder, for putting suture ligature in tonsillar fossa.

oozing, pressure will control it. If not, or if a pulsating bleeder is seen, its location is carefully ascertained, and it is grasped in the tonsil hemostat. Crushing will in nearly every instance prove sufficient, but if there remains any doubt as to its security the bleeding point may be tied. It is my practice to use a suture ligature, as it greatly simplifies the tying and is more secure. Placing a suture at the exact point desired is very often difficult, and I have sought to simplify the procedure by designing a needle holder for the purpose (Figure 1). The difficulty has been to engage the point of the needle at the proper spot and still have enough curve to carry it through the tissues. By cutting a slot lengthwise through the jaw of the needle holder, it is possible to grasp a curved needle at any point in its length, letting the eye extend back through the slot. This also permits grasping the needle with point straight out, usually the best way for this work. One suture will usually suffice, number one catgut being used, but two may be put in if desired, or a single mattress suture may be employed. These sutures do not require removal,

Early secondary hemorrhage, coming on within a few hours after operation, is sometimes most profuse and may require reanesthetization in a patient not amenable to control. The same principles are applied in these cases, however, a sponge in the fossa being utilized for immediate control of very profuse hemorrhage until such time as proper instruments and assistance may be had. A clot should never be left in a bleeding fossa. Great care should be used in watching these patients after operation, especially until they are entirely out of the anesthetic, as it has frequently happened that blood has been quietly swallowed until the patient was nearly exsanguinated before the sudden vomiting of a quantity of fresh blood or the discovery of a bad pulse has called attention to the fact that something was wrong. They should be placed in the prone position with the head turned to the side and lower than the body, so that blood and secretions will flow out of the nose and mouth, and the condition should be carefully watched. Anything less than the best of hospital care is out of place in the management of these cases.

True secondary hemorrhage, coming on several days after operation, is practically never profuse enough to be serious, and is usually the result of separation of slough from the exposed surface, or comes from the granulations. If it requires control, pressure will usually be found sufficient.

Adenoid bleeding is rarely serious. Packing of the nasopharynx will usually control it, but the bleeding vessel may be located and tied as reported by Adams.³ Beck's method of exposure of the nasopharynx by retraction of the palate with a soft catheter passed through the nostrils and out of the mouth is admirable for this purpose.⁴

Accidents from Anesthesia.—This subject has been so well considered in other connections that I shall pass over it very briefly. There is no one thing in the tonsil and adenoid work that is more important than the anesthetic. The anesthetist should be the judge of the anesthetic of choice in each individual case, but my preference is for warmed ether vapor, the patient being sufficiently relaxed to do away with the pharyngeal reflex but not to the point of abolition of the laryngeal reflex. This point is reached before commencement of operation and is maintained throughout by use of the warm

ether vapor apparatus. It is surprising how frequently the operation is unnecessarily prolonged by unskillful administration of the anesthetic, a task that should be delegated to none but a skilled and experienced anesthetist.

When operating under local anesthesia, practically the only thing to be watched for is the toxic effect of cocain. As an idiosyncrasy against it does undoubtedly exist in rare cases, its use should be very sparing until tolerance has been demonstrated. Novocain and apothetin have been very satisfactory in my hands for infiltration anesthesia, and have given no bad results. Sloughing and edema have been reported following the use of quinin and urea, and I believe constitute a contraindication to their use.

Socalled "status lymphaticus" should probably be included under this head. There is no doubt that deaths from this much-blamed condition have occurred, and they are probably in all cases due to arrested respiration from pressure of an enlarged thymus on the trachea, according to Jackson's investigations.⁶ In all cases when respiration ceases during anesthesia and cannot be immediately started, the trachea should be opened and a tracheotomy tube inserted to reach if possible below the probable level of the thymus.

Suffocation.—In operating under general anesthesia this difficulty has arisen in numerous cases. Inspiration of pieces of tissue or quantities of blood may be the cause, and enlarged thymus has been mentioned, and tracheotomy has been necessitated after the use of hydrogen peroxid in the throat to control hemorrhage. Prompt tracheotomy is the only treatment when these emergencies arise, but most of them can be prevented. The operation should be done in the horizontal position when a general anesthetic is employed. The head should be lowered four to six inches below the level of the table, careful hemostasis should be observed, and with the use of a good suction apparatus to keep the throat clear of blood and mucus, most such accidents should be preventable. I am opposed to the use of all chemical hemostatics, especially hydrogen peroxid.

Acidosis.—This is a postoperative complication much considered recently and often met with in these cases. It occurs probably more often in tonsil or adenoid cases than in any

other one class of patients, but is not as a rule serious. It has been my misfortune to see one fatal case, however, and others have been reported, so that it is not a matter to be considered lightly. Pre- and postoperative examination of the urine for acetone and diacetic acid, with the administration of sodium bicarbonate and glucose per rectum or intravenously, both as prophylactic and treatment, are the measures of safety.

Postoperative Pain and Soreness.—One of the most constant and unpleasant manifestations with which we have to deal following the tonsil operation, particularly in adults, is postoperative pain. Coming on almost immediately in local, and, as soon as the patient is conscious, in general anesthesia, it persists very severely for varying lengths of time. After trying many remedies, I have finally come to follow one routine in all these cases, and I am willing to state positively that it has been entirely successful in relieving postoperative pain. It consists in the application to the fossa of a solution of fifteen grains each of cocain, menthol and phenol in one dram of alcohol. It is sometimes, in very bad cases, necessary to repeat the application in an hour or more, but one or two applications are usually sufficient to control entirely the pain that ordinarily follows these operations. In some cases the application seems also to lessen the soreness persisting for some days thereafter, but it is my opinion that it is but slightly influenced thereby. General anodyne treatment is necessary for that purpose, if anything is attempted. It is much easier and more practical to make this application following local than after general anesthesia, but it also seems that it is more necessary, probably because of the entirely normal mental condition of the patient.

Sepsis.—Although slight superficial infection of the exposed tissues is no doubt present in all cases following tonsillectomy, it is but seldom that a serious condition supervenes. It has been my experience to have four cases of local infection of some moment. In three the condition developed into one of typical peritonsillar abscess. In the fourth, a suppurative adenitis involving the anterior cervical chain and the submaxillary glands developed, necessitating operation for drainage externally, but with eventual cure. Vanderhoof reports a very similar case.⁶ All four of these patients were oper-

ated on under local anesthesia, and it has occurred to me that infection might have been carried into the deeper tissues by the needle, particularly since these operations are carried on in a septic field. I have since discontinued the use of deep injections for local anesthesia.

Several deaths from general septicemia have been reported as following the tonsil operation. Dean reports three cases,⁷ and I have personal knowledge of one case with fatal termination occurring in the practice of a personal friend.

Prevention of these infections is a problem for serious consideration, strict asepsis being desirable, of course, but difficult of attainment for obvious reasons. It is our duty to see, however, that septic foci in the mouth, nose and sinuses are properly disposed of before operation. The efficiency of antiseptic applications to the fossa is questionable, although many surgeons advocate such measures and routinely apply tincture of iodine, thinking it does lessen the incidence of infection.

Acute articular rheumatism has been reported by both Dabney⁸ and Dicky⁹ as following tonsillectomy. I have had one case of endocarditis develop almost immediately following operation under local anesthesia. It is easy to understand how liberation of toxic materials at the time of operation might give rise to these acute infections, and careful attention should be given the cardiac condition of our patients, both before and after operation, particularly when they are not doing well during convalescence.

Pulmonary Abscess.—Manges has reported nine cases of abscess of the lung following tonsillectomy¹⁰ and others have been reported. It has been thought that this complication is due to inspiration of blood, mucus, pus or bits of tissue. If so, careful anesthesia, careful hemostasis, use of the suction apparatus and lowering of the head of the table should prevent a large majority of them. Richardson, however, has suggested¹¹ that the infection may reach the lung by other channels, notably the lymphatics, or possibly by way of the veins. Such a suggestion seems highly probable, to my mind, particularly as regards the venous channels, when we consider the anatomy of the region. The lymphatics, however, can with less reason be included in this theory, on account of

the fact that all lymph from this region passes through numerous lymphatic glands before it reaches the large vessels, thus being filtered of any infectious material before reaching the lungs. Care to prevent opening the tonsillar plexus should, then, guard further against this form of complication.

Pulmonary infarct, as reported by Scruton,¹² can be explained in like manner, and its prevention would embody the same principles.

Pneumonia.—This disease has been frequently reported as a complication. It has been my experience to have one case of pneumonia following operation under local anesthesia. Others have had similar experiences in other lines of work, due, probably, to lowered resistance from shock of operation. Under general anesthesia its prevention would embody the same principles outlined for prevention of abscess of the lung. Rapid work, minimizing the amount of anesthetic necessary, and the administration of warmed ether vapor should also play their part.

Foreign Bodies in the Lungs.—Several cases of foreign bodies, such as dislodged teeth, having found their way into the bronchi, sound a warning against careless use of the gag, particularly in children, who are very likely to have loose teeth that may be easily dislodged and lost.

Otitis Media.—Acute purulent otitis media has followed two of my own cases and has been frequently reported by others. Lowered resistance and local infection following the removal of adenoids were undoubtedly the cause, and prevention is difficult. Moore reports one case of mastoiditis following the same cause.¹³

Lymphoid Hyperplasia Following Tonsillectomy.—Experience has demonstrated that the most careful work will not guarantee against the unexpected appearance of lymphoid tissue in the fossa or attached to the pillars following the healing of a tonsillectomy wound. We all know that most so-called "recurrences" are due to faulty surgical technic, but not all of them. There is no doubt that there is extracapsular lymphoid tissue in the tonsillar fossa, in the pillars, in the plica, and between the base of the tongue and the tonsil in many cases, and such tissue will undergo hypertrophy following the operation and will sometimes embarrass us by its

appearance in a fossa which we considered absolutely clear of tonsillar tissue at the time of operation.

I have been able to demonstrate the presence of extracapsular lymphoid tissue histologically, both in the pillars and in the floor of the fossa; tissue which is structurally identical with that of the tonsil itself, but which is entirely extracapsular and ordinarily would not be removed at operation (Figures 2 and 3).

Deformities.—Damaged pillars, a torn palate or a uvula inadvertently removed may be included under this head. Most injuries to pillars and palate are the result of carelessness or incompetence. It is true, however, that at times the mu-



FIGURE 2.

Illustrating presence of extracapsular lymphoid tissue in the plica and in the mucous membrane of the pharyngeal wall below the tonsil.

cous membrane may be stripped from the posterior pillar and may even carry with it the uvula. This accident is due to the fact that the tonsil is adherent to the pillar, and when drawn into the snare, brings with it the attached membrane, which is stripped up from the pillar and may even tear the uvula away with it. In these cases the uvula will be found attached to the tonsil by a short strip of mucous membrane, after removal. Care in freeing the posterior pillar, and the use of a small fenestration will prevent this accident. Extreme cases of deformity from laceration of surrounding tis-

sue during operation are likely to result in damage to the voice and interference with palatal function. It is remarkable what serious deformities may exist without apparent interference with vocal function, however, although such serious damage would no doubt prove fatal to a fine singing.

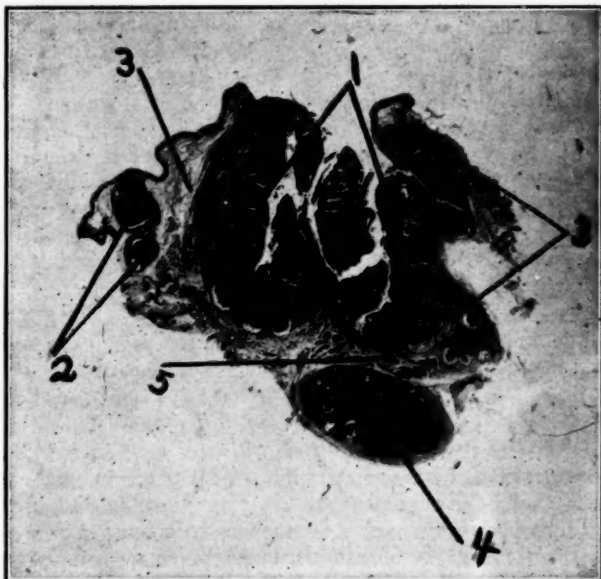


FIGURE 3.

Cross section of tonsil showing extracapsular lymphoid tissue.

1. Normal gland structure.
2. Islands of lymphoid tissue in pillar.
3. Fibrous tissue of capsule.
4. Large nodule of lymphoid tissue external to capsule.
5. Muscle fibers of superior constrictor.

voice. Excessive scar formation and contracture are likely to follow operation on syphilitics.

Nasopharyngeal scarring is also often seen and results from too violent use of the adenotome, even the eustachian eminence having been sacrificed in certain cases. Tubal troubles are often secondary to these conditions, both palatal

and nasopharyngeal, on account of interference with proper action of tubal and pharyngeal muscles.

Neuralgia and Dryness of the Pharynx.—Subsequent to healing of the tonsillectomy wound we sometimes have patients returning with complaint of pain in the lateral pharyngeal region near the base of the tongue, with dryness. There is no doubt, as has been shown by Matthews,¹⁴ that branches of the terminal portion of the glossopharyngeal nerve may be caught in the scar at the junction of the palatoglossus with the tongue, giving these symptoms. Occasionally a short section of the nerve is exposed at this point during operation, resulting in unusual sensitiveness, with severe lancinating pain, referred along the inside of the lower jaw and lateral pharyngeal wall. This can be quickly relieved by local application of cocain, but will return until such time as the nerve is covered by granulations. I have had one such case in my own practice.

Many other complications and sequelæ have been mentioned in the literature, but they have either been so extremely rare or so entirely unexplainable, or have seemed to me to be so unfairly laid at the door of the tonsil operation, that I have not taken the space to mention them.

In conclusion, I wish to state that this paper is not intended to serve as an arraignment of the very valuable and useful procedure under discussion nor as an argument against the performance of these operations, but is presented simply as a suggestion toward the lessening of the number of serious or unpleasant complications to somewhere near the necessary minimum, for we all know that no operation can be undertaken without incurring a certain amount of necessary risk.

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V.

OUR EXPERIENCE AT FORT OGLETHORPE, GA.,
WITH ACUTE AFFECTIONS OF THE MIDDLE
EAR AND THE MASTOIDS FOLLOWING
MEASLES.*

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One of the first things which forces itself upon the army surgeons is the marked difference in the practice of medicine in military as compared with civil life. This is particularly true of the acute affections of the ear. Much or all that he has learned about these conditions, possibly as the result of years of study, must be promptly forgotten upon his entrance into a military camp. The supreme, all-controlling factor in military practice, at least so far as the upper respiratory tract is concerned, is infection. Infection is ever present, always to be dreaded and constantly to be guarded against. No finer work has been done in the various cantonments of the country than the measures instituted to prevent the spread of infection. Remarkable results have been secured in this respect. Much, unfortunately, because of the inherent conditions present, remains to be done, and at the best we must expect to be called upon to treat in the future as we have in the past, inflammatory conditions affecting the mucous membrane of the upper respiratory tract, of greater or less severity, the result of infection.

During the past winter and spring, these cases formed a large part of the cases at the U. S. Army General Hospital, Fort Oglethorpe, Ga. The medical wards were continually filled with cases of bronchitis or of a severe type of bronchopneumonia, mumps and especially measles.

Of the cases of measles, it was particularly true that a

*Read before the twenty-sixth annual meeting of Association of Military Surgeons, October, 1918.

majority was associated with acute laryngitis and rhinitis. Of these, the number was large who in the course of the disease developed an acute affection of the middle ear. Many of these, in spite of the most prompt and energetic treatment, went on to acute mastoiditis, requiring immediate operation to avoid serious or fatal intracranial complications. The number of ear cases treated from January 1st to July 14th was 1,685, of which 607 were cases of measles. The symptomatology of the cases of otitis media acuta occurring in measles was strikingly characteristic and differed entirely from the ordinary classical picture met with in civil life. The patient, more or less toxic, with elevation of temperature, pronounced leucocytosis and racked with cough from his bronchitis or bronchial pneumonia, would be found lying entirely free from all complaint or pain, either subjective or objective, as far as the ear is concerned.

In fact, it has been our experience that in a great majority of these cases, the ear complication was discovered only in the course of a routine examination. At the most, the patient would admit upon direct question that there was feeling of stuffiness in the ear. The examination of the ear would show no characteristic picture. Usually the landmarks were obliterated, and there was a boggy, unhealthy appearance of the drum membrane. If seen extremely early in the infection, there might be a slight injection in the handle of the malleus and Shrapnell's membrane. At a variable time after the onset, bulging of the ear drum takes place in the posterior upper quadrant. To wait for this to occur is almost certain to mean mastoiditis and operation. It is our rule at Fort Oglethorpe to freely open the drum immediately upon discovery of any change in its appearance. Often the incision will be followed by a mucopurulent discharge. If the incision has been made early enough, if the infection is not too virulent and if unceasing vigil has been exercised in maintaining free drainage by repeated paracenteses, the case will gradually go on to convalescence and recovery. If, on the other hand, free drainage has not been established or maintained, if the organism present, usually a streptococcus or pneumococcus, is exceedingly virulent, if there is a diseased condition of the nose, and finally if the resisting power of the patient has been too much

lowered, the inevitable course of the disease is toward an extension of the process from the attic to the antrum and the mastoid cells. Acute mastoiditis appearing in a patient suffering from measles is, as a rule, just as free from pain as is otitis media. It is almost impossible to believe that a patient can have a mastoid full of pus and yet insist that he is not suffering and scarcely admit any tenderness on pressure, either over his antrum or over his tip. The only sign that can be depended upon are changes in the upper posterior wall of the canal. While it is the rule to find these to a greater or less degree, according to the duration of the disease, we have met cases where they were almost if not altogether lacking. The discharge is wont to be profuse and frequently under pressure, as shown by pronounced bulging in the line of incision.

In several cases an extensive destruction of the drum membrane took place which at first we were inclined to ascribe to the local anesthesia used. We were finally forced to the conclusion that it was due to the virulence of the organism present. Upon the recognition of changes in the auditory canal wall, immediate operation is indicated. In rare cases where these changes are absent, with excessive discharge or destruction of the drum membrane for a number of days, it has been our rule to operate. Any definite day of the disease for operation is out of the question. We have never operated too early, even if it has been only the fourth, fifth or sixth day. Often we should have operated earlier. Operation is wont to disclose extensive changes in the mastoid cells. If the operation has been performed early enough, the progress to recovery, while usually unduly slow, is uneventful. If operation has been delayed, it is common to meet with epidural abscess, sinus thrombosis, brain abscess or meningitis.

During the past winter we have tried in the mastoid wounds dichloramin-T. While in some cases it proved satisfactory, we did not satisfy ourselves that it was materially better than a dry wick packing.

In one particular our experience has been especially gratifying. Without exception, these cases operated upon were exceedingly sick men. In all of them, the employment of the usual anesthesia, ether or chloroform, could not have failed to produce pronounced nervous shock and thus serve as the de-

ciding factor against the patient's recovery. In place both of ether and chloroform, it has been our rule to use nitrous oxid gas and oxygen. The immediate and later results have been truly remarkable.

The records, which have been kindly prepared for me by the chief anesthetist of the hospital, show that from April 3rd to July 26th, thirty-one cases of mastoids complicated by measles were anesthetized with nitrous oxid gas and oxygen, and of these ten had bronchopneumonia at the time of the operation and one had mumps. The shortest time for administration was forty minutes and one was three hours and forty-five minutes. The average time for administration was one hour and fifteen minutes. There were no untoward symptoms during the anesthesia or complications due to the anesthesia. The induction period was about three minutes. All patients were conscious before the dressing was completed. One case requiring an anesthesia of nearly four hours was particularly noteworthy. It was a man suffering from measles, double bronchopneumonia and double mastoiditis. Both mastoids were found diseased and requiring operation. There was absolutely no shock following the operation, and the patient's temperature the next morning was virtually normal. This was true of all the cases where this form of anesthesia was employed. Beyond question, it is the ideal anesthesia for such cases and commends itself strongly for all extensive or serious operations.

A few words in conclusion: Two important deductions force themselves upon us as the results of our observations in the otologic complications of measles and other infectious diseases.

First, that they are so unusual in their symptomatology that the only certain means of recognition is the examination of the ear itself. This in a limited service is the province of the specialist. In army life, dealing with large bodies of men, such special attention manifestly will often be impossible. This necessitates that every ward surgeon should be capable of making a satisfactory otoscopic examination. So important has this seemed to us that during the present fall, in connection with our work in the school of otolaryngology,

we have been giving such instruction to every member of the school of surgery in order that he might acquaint himself with the normal and thus be able to recognize the abnormal appearance of the membrana tympani.

Second.—Far outweighing all measures addressed to relieving infection of the ear, is prophylaxis to prevent such infections from developing. Much has been done in this direction both here and in other cantonments throughout the country. All improved sanitary procedures, it is unnecessary to say, are to be carried out. In addition to these, local treatment of the upper respiratory tract of some form or other is distinctly indicated. What the best form of these is yet to be determined. Gargles, such as a warm saline solution, or Dobell's solution, recommend themselves. At present we are using at Fort Oglethorpe a two per cent solution of dichloramin-T, which properly prepared is free from irritation. The suggestion made recently by Lieut.-Col. Harris P. Mosher of an establishment of steam huts for this purpose, such as are now used in the British Army, particularly recommends itself. Any or all means such as these which will cut down the inroads of the bacillus, are the only sure means to complete success in this important line of work.

VI.

ERRORS AND FAILURES IN BRONCHIAL AND ESOPHAGEAL ENDOSCOPY.

By E. M. HOLMES, M. D.,

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It is generally accepted by operators of experience in endo-esophageal and endobronchial work that the presence of foreign bodies in the esophagus and in the trachea and bronchus should always be considered of serious consequence until sufficient time has elapsed after their removal for the elimination of postoperative reaction, septic or traumatic. With our present instruments and technic, many of these cases of foreign body in the esophagus or bronchus are easily removed, and there are no signs of serious results after the removal. There are a few cases which not only tax our skill, aided by the most improved instruments, but which cannot be removed without producing fatal results. Again, there is an occasional case which seems simple, from the operative standpoint, but which terminates seriously and perhaps fatally from shock or sepsis.

It is not my purpose in this paper to present the subject in general, for this has been so often and well done by many of our men and so masterfully presented by our American father of esophagoscopy and bronchoscopy, Chevalier Jackson. What I feel is of the greatest importance at this time is to report cases showing gross mistakes in diagnosis and failures in treatment.

One of my cases, through error in diagnosis, was subjected to an esophagotomy for suppose carcinoma, and another case met with failure in extraction because the swelling of the esophagus was so marked that it was an impossibility to remove the body (a cap to a beer bottle). Still another case, a penny in a sack off the left bronchus, was so surrounded by cicatricial tissue that it could not be removed, and I believe, had we not refused our desire to offer more traction while within the grasp of our forceps, we would have produced se-

vere trauma, and, perhaps, fatal results. As we endoscope practically all cases coming to the Boston City Hospital, showing symptoms or signs of esophageal obstruction, I have seen several cases of strictures and quite a number of cases of spasm of the muscular walls of the esophagus. There are also, in this group of cases, a considerable number of malignant growths. I was absolutely wrong in diagnosing and demonstrating a tumor as probable carcinoma of the esophagus, in a case I examined for Dr. Lund and upon which he operated, by esophagotomy, two days after the endoscopic examination. Had the endoscope been again used, after the patient was anesthetized, the external operation would not have been performed. The patient was a man, forty-one years old, of good color and general healthy appearance. His heart, lungs and blood pressure were normal. The Wassermann tests were negative. He gave a history of beginning trouble in swallowing food six months before entrance to the hospital. The conditions became steadily worse. He had considerable pain and soreness back of the larynx and had not swallowed solid food for several weeks before examination. He had lost twenty pounds in weight and was easily exhausted. His family physician, Dr. Flanders, had been unsuccessful in trying to pass bougies even of the smallest size. Under cocain he was put under suspension, and the lower pharynx and larynx appeared absolutely normal. A cocain applicator was now passed into the esophagus and met with an obstruction about three centimeters below the lower border of the cricoid cartilage. When the esophagoscope was introduced we found this obstruction to be a mass, somewhat irregular in shape, of light red color, and about the size of a walnut. It filled the lumen of the esophagus, and the stricture was somewhat ballooned above its contact with the growth. Dr. Lund had asked me to cause as little inconvenience as possible to the patient, as he was afraid he would take fright and not have an operation which might save his life. A number of us saw the fine view of a tumor filling the esophagus, but I did not use a probe while the scope gave view of the field. This, I believe, was the first mistake. Two days later, while the patient was being anesthetized and was practically under, Dr. Lund tried to pass a small esophagus dilator as a director, but could not

introduce it beyond the obstruction. Later the anesthetist passed this by the obstruction with little effort. I now made mistake number two. I should have again scoped the esophagus while the patient was profoundly anesthetized, but I felt so sure of our previous findings that the esophagoscope, for final inspection, did not present itself. The esophagus was laid bare and then opened longitudinally and absolutely nothing abnormal was found. Fortunately, the patient made a good recovery and was able to eat solid food and was much pleased by the results of his operation. This man, showing no other sign of a neurotic tendency, undoubtedly had spasm of the upper wall of the esophagus, which produced an invagination of a portion of the wall, producing almost absolute blocking of the lumen and the appearance of a well defined intraesophageal growth. Another strange thing was that the progress of the symptoms had been progressive without intermission. The lesson learned is not to judge positively by symptoms and appearance of an esophageal growth unless the patient is absolutely relaxed by ether and never begin a laryngectomy for supposed growth without endoscopic examination immediately before the operation.

On February 8, 1917, a man, forty-six years old, was referred from the medical service for bronchoscopy and removal of a penny which showed by radiograph in the left lung. Eleven years before, the coin was imbedded, and following this accident there was severe cough for several weeks. Then only an occasional spell of coughing for about a year. About this time there began to be considerable secretion coughed up. The cough and expectoration were always worse after arising in the morning. He had been able to work and remain in fairly good health all these years, but the purulent secretion had gradually increased. Under local anesthesia the bronchoscope was carried into the left bronchus. There was so much purulent secretion that it took some time to clear the tube for observation. There was no coin in sight, but there was an irregular ulcerlike area on the posterior wall of the bronchus. A probe passed into this but did not come in contact with the foreign body. The patient then coughed, and for just a moment I saw this area of bronchus bulge forward and the blackish edge of what I took to be the penny showed

for a short distance in the opening of the bronchial wall. I again unsuccessfully tried to reach the position of the coin with a probe. The patient was next turned upon his side without result as regards endoscopic view. He then was turned stomach down with no better result. He next got into the knee chest position, and there was a considerable flow of the secretion from the sinus cavity into the bronchus. After this was removed the edge of the penny appeared across the opening as a black band, but, as the edge was pointing downward, I was unable to obtain a grasp with the forceps at hand, nor could I permanently change the position of the coin. The patient wished an anesthetic, and I decided to construct a forcep with a lateral return grip; and, armed with this instrument, the following morning I quite confidently proceeded with the patient under ether. After clearing the bronchus, and with the patient in reverse Trendelenburg's position, the edge of the coin appeared as at the previous examination. With the new forcep a firm grasp was obtained, but I found that the lumen into the cavity holding the penny was surrounded by dense firm tissue, and, without the risk of extensively tearing the adjacent lung tissue, it was impossible to get our object. I was tempted to cut through the surrounding tissue and enlarge the lumen sufficiently to allow the extraction of the foreign body, but decided to postpone further effort for the time. Two days later patient said he had carried the cash with him for eleven years and hated to think of being reduced to going without a copper. A few days after our attempt the severe symptoms began to subside, and after three weeks there was scarcely any cough and very little secretion. Before discharge from the hospital another radiograph was taken, and to our surprise there was no sign of the penny, and we are forced to assume, that even with our care, we caused sufficient trauma to produce ulceration and necrosis of the cicatricial band and a release of the enclosed wealth, which was unfortunately lost without knowledge.

On October 22, 1914, a man, forty-one years old, was admitted to my service who was suffering severe pain in the lower throat from the effects of having swallowed the cap of an ale bottle. He was a night watchman and had been feel-

ing somewhat below par for two or three weeks and had taken a raw egg in half a glass of ale every morning when arriving home. In some manner a cap got into the glass and as he poured the contents down he felt a sharp pain in his throat. He tried various remedies, including emetics, but was unsuccessful. When we examined the patient he was much excited, had a bounding pulse and about 102 degrees of temperature. X-ray showed outline of cap about an inch below the cricoid cartilage. There was so much induration of the esophagus at and above the cricoid constriction that it was difficult to introduce the esophageal tube. After removing the bloody mucous secretion below end of tube the cap was easily seen. A straight biting forceps would rotate the cap and produce the effect of a mushroom anchor. Our side biting forceps would not hold the fluted edge. We were practically positive that it would be impossible to remove this firm saw edged body through the indurated constriction above it without considerable trauma. It was also imperative that it should be removed from the already lacerated and infected esophagus. It was my opinion at the time, and I still believe an esophagotomy was the proper procedure. The patient absolutely refused any cutting operation. I therefore passed a strip of gauze down at the smooth side of the cap and then caught it from below on the rough side by the esophageal hook. This procedure, in a measure, covered the sharp saw-like edge, and with little effort the mass was carried into the stomach. By the two days' efforts with emetics and efforts to swallow solids the esophagus had been seriously cut and abraded and was apparently septic. The temperature gradually increased and death resulted two days later. It is probable that the same results would have followed an esophagotomy, but I believe we could have attended more satisfactorily the immediate as well as the later needs of this case by that procedure.

VII.

SUBMUCOUS RESECTION OF NASAL SEPTUM— COMPLICATIONS AND ACCIDENTS ENCOUN- TERED IN ONE HUNDRED AND THIRTY- THREE CASES OF SUBMUCOUS RESECTION.*

BY CHARLES G. STIVERS, CAPT., M. C.

This article is not an attempt to state how this operation should be performed, nor does it invite discussion as to methods of surgical procedure. It is simply a recital of the accidents and complications I met in one hundred and thirty-three cases.

I present this record of one hundred and thirty-three cases of submucous resection of the nasal septum, with the hope that the experience which has been of great value to me may be of interest and help to all who are interested in nasal surgery.

I will not attempt a discussion of the history of the operation, as it is of comparatively recent development and doubtless known to all present. Ballenger and Freer have elaborated much useful technic, and their specially designed instruments have been found adapted to the rapid and careful performance of this operation. The outstanding fact is that new indications are being found daily for its employment, even in the line of conservative surgery, meaning the saving of mucous secreting surface in the nose. It is a comforting thought that in the choice of this submucous resection no mutilation is contemplated and indeed should never be accomplished.

Contrast this with the almost abandoned operations for the removal of so-called "spurs" and "ridges" by sawing or shaving, with their reckless disregard for the integrity of the mucous membrane of the nose.

*Read before the Eye, Ear, Nose and Throat Section, San Francisco County Medical Society.

In the preparation of aviation candidates for active flying duties, the government officials have wisely decided that no man with obstructed nasal respiration can answer the requirements of flying. Accordingly one of the prerequisites is that a candidate who has an obstructed nose from a deviated septum must have a satisfactory operation performed for the relief of the obstruction. The recent campaign in Los Angeles, in which candidates for aviation were examined, disclosed the fact that 5.75 per cent of the total number examined were operated on for deviation of the septum. Out of this number twenty-two are contained in this report as having been operated by me.

Preparation of Patient.—Nasal irrigation with warm salt and soda solution; patient in office operating chair, semireclining on back; a good light from electric bulb behind patient's head, reflector on operator's head.

Thin, flat layers of surgical cotton are squeezed out of a solution of 5 per cent cocain, to which has been added one-sixth by volume of 1 to 1,000 solution of adrenalin. The surface to be covered is the entire septum from the mucoskin back to the posterior edge of the septum. The cotton pledgets or pads, first dipped into the cocain adrenalin solution, and as thin and as dry as can be made by firm pressure between thumb and finger, are laid against the septum by the aid of bent forceps, the nostril being held open by a large nasal speculum, the entire surface of the septum being covered with the cocain adrenalin mixture on cotton. From twenty to thirty minims of the cocain adrenalin solution will suffice. The mucoskin border requires infiltration with one-half per cent solution of novocain combined with two drops of adrenalin (1 to 1,000) solution. The infiltration needle is inserted from above or below, a drop or two pressed out, then the needle is pushed on ahead, after waiting a few seconds when a new spot is infiltrated. In this way the only pain experienced is in the initial puncture. The first incision (rarely more than one is needed) is made in the most accessible locality of the anterior border of the septum just within the skin border. Care should be taken to avoid making the first incision in skin, as it is very difficult to elevate, bleeds freely, is not so easy to suture, and scars in it are apt to be covered with a

dry, scaly crust that itches and leads to scratching by the patient.

The first incision is curvilinear, convex anteriorly and penetrates the mucosa and perichondrium only, down to the cartilage. Separation of the mucous membrane and perichondrium in one layer is essential. If it is discovered that the mucous membrane alone has been elevated, the perichondrium must be searched for and elevated with it. It is impossible to mistake the glistening surface of the cartilage when one has reached it, whereas the perichondrium is rough, velvety and bleeds freely. The first elevation of the flap is made with a semiblunt elevator. When a distance of one-third inch within the flap has been gained, I change to a right angled blunt elevator and in this way proceed with more speed. The difficult points are at the junction of the perichondrium with the periosteum of the maxillary spine in the floor of the nose. This requires sharp dissection.

Returning to the site of the original incision, the cartilage is cut. Following the line of the mucous incision, a sharp elevator is put through the cartilage, carefully avoiding perforation into the opposite nostril. The flap is then elevated, and after a sufficient flap is obtained the hairpin speculum is put in and with Ballenger's swivel knife a large piece of the triangular cartilage is excised. The swivel knife should travel in a straight line backwards and parallel to the bridge of the nose, to the perpendicular plate of the ethmoid and then vertically toward the floor of the nose; then returning to the mucous membrane incision. It is well to notch the cartilage with scissors above and below, the first notch above showing where the Ballenger knife enters and the notch below where it emerges. With a dry field, bone forceps are then employed to remove all deviated cartilage and bone. Hurd's forceps are useful in removing septal tissue in the floor of the nose, but the chisel will be necessary to remove the spine of the maxillary. With an assistant holding open the nostril, the chisel is applied after freeing the bone from all adherent periosteum and tapped lightly with a mallet to remove the bone. Hemorrhage at this point usually follows from wounding of the terminal branch of the palatine artery, but it can be checked with pressure of dry cotton or adrenalin or actual

cautery. A final inspection between the flaps, to be sure that all loose bone and cartilage, clots of blood, etc., are removed and hemorrhage checked, then a stitch to close the original incision, or any perforation, is put in. I have preferred iron dyed silk No. 0 or No. 1 carried in a curved needle about three-eighths of an inch long. Perforations around the incision can usually be included in the stitch to close the incision, but if in other localities, require separate stitches which may be tied in either nostril. When the stitch has to be taken well within the nostril, a right angled stitch carrier is used. I have recently tried suturing with straight needles and fastening in the sound side with a small splitshot, with good results.

ACCIDENTS DURING OPERATION.

1. Hemorrhage.—This occurs usually when the posterior end of the vomer is attacked or when chiseling the spine from the superior maxillary in its anterior portion. The former is usually not profuse, the blood vessel being a small one, usually a branch of the palatine artery. The bleeding from a cutting of the terminal branch of the posterior palatine artery at the anterior edge of the septum is more free and harder to check, but it can usually be done by packing with a bit of dry cotton or cotton dipped in adrenalin solution (1 to 1,000). In some cases I have been obliged to resort to the actual cautery or the tip of a large, blunt probe pressed against the bleeding vessel.

2. Perforation by spicules of bone or by instruments pushing through the mucous membrane, or forceps seizing mucous membrane and tearing same.

Case 10.—H. B., colored; operation under local anesthetic. Free hemorrhage during removal of maxillary spine; finished operation; one stitch. Free hemorrhage after operation on following night, controlled by ice bag and pressure. Removed stitch on first day after operation. Free hemorrhage, repacked nose. Next day removed packing, no hemorrhage. Good result.

Case 33.—F. F., pugilist; much scar tissue and many adhesions. Hemorrhage copious from freeing adhesions and

scar tissue. Checked by pressure and adrenalin; good result as to accomplishment of good nasal respiration.

Case 69.—A. M., office case; local anesthetic. Spurting of artery cut by chiseling spine of maxillary, controlled by pressure. Operation completed.

Case 119.—Carl V., California Hospital; free hemorrhage from terminal branch palatine artery. Not controlled by packing and adrenalin, but was controlled by actual cautery point. Good result.

Case 120.—Miss V., age seventeen years, Mexican; office case. Free bleeding; spurting artery from terminal branch of palatine while chiseling off maxillary spine; checked by pressure and tincture of benzoin; operation finished.

Perforation. Case 16.—R. M. B. During operation I made a perforation through from right to left side, but waited until completion of removal of septum; then closed the perforation by one stitch in each side, with perfect result.

Case 21.—C. W. C. Incision right side. In removal of vomer, which came away in one large piece three-fourths of an inch long, and some fragments, the flap was perforated low down on the right side by the sharp edge of the bone; I put in two stitches from the left side, one passing through into the right nostril and including the edges of the perforation, bringing it back and tying it in the left side. Second suture closed the surgical incision. Result was good.

Case 32.—Lieut E., aviation candidate. Small linear perforation near base of septum produced while chiseling out maxillary crest. Finished operation, then closed perforation with two stitches. Result good.

Case 34.—O. L. F. (Perforation and tearing of the flap). Owing to perichondritis and adhesion, I tore the flap longitudinally about one-half of an inch along the base of the nose; also perforated into left nostril. Finished operation; then three stitches put in to close the tears. One in the left nostril closed the perforation; the second and third stitches put in right nostril, one to unite torn flaps, the other to unite flap on operation side. Good result.

Case 35.—Miss J. F. Perforation small, in vertical arm of primary incision, which consisted of two arms, one vertical, one horizontal along an acutely angular deviation. Two

stitches, one in each arm of the incision; the one in the vertical closed the perforation, the other stitch in the horizontal arm of the incision fastened the flap to the border. A small hematoma developed, three days after the operation. Pressure by Simpson compressed gauze splint applied to the site of the hematoma. Dressing each day until May 4th, discontinuing the pressure, however, after the third day when the flap loosened at the lower edge, and healing progressed by granulation and absorption of the edge of the flap. A good result followed and no perforation, probably because there was no purulent infection of the hematoma.

Case 53.—F. J., age eighteen years, Mexican; local anesthetic. Small perforation accidentally made in going through cartilage. Closed by one stitch. Good result.

Case 54.—F. J. Local anesthetic. Small accidental perforation made in going through cartilage. Closed by one stitch. Good result.

Case 67.—K. M. Local anesthetic. Small accidental perforation made in going through cartilage. Closed by one silk stitch. Good result.

Case.—A. R. Perforation at the site of old scar tissue in flap. Closed after completion of operation by one stitch. Result good; no perforation.

Case 112.—R. L. T., brakeman, S. P. R. R.; office case. Small perforation made during operation while removing mucous membrane over acute angular deviation; closed by one silk stitch; good result.

Case 124.—L. W., age twenty-six years; San Fernando; office case. Operated November 6, 1916; removed enchondroma size of lima bean from anterior edge of triangular cartilage. Small perforation closed by stitch; good result.

Case 128.—C. S. R., Hindu. On account of severe syncope recurring at short intervals, I was unable to sew up a perforation in the center of the nose over the perpendicular plate of the ethmoid. For the same reason, not enough septum was removed and the bone is still blocked, but on account of patient's general physical condition I have always feared to re-operate.

Syncope, Mild. Case 47.—W. M. H., aviation candidate; office case. When I made the first incision, patient felt faint.

Placed in recumbent position and given ammonia. Recovery prompt. Operation completed.

Case 51.—Capt. I.; office case; local anesthetic. Mild syncope during removal of bone by forceps. Recovery after recumbent posture and ammonia. Finished operation.

Case 64.—D. E. L., alcoholic; red face. Local anesthetic; office case. During operation complained of feeling cold. I immediately put operating chair in recumbent position and gave aromatic spirits ammonia in water, and whisky; pulse soft but slow; face continued red. Recovery in two minutes; finished operation.

Case 89.—W. H. P., aviation candidate. Mild syncope and recovery after taking ammonia. Operation completed.

Syncope, Severe. Case 25.—Mrs. D. Hysteria in the middle of the operation and continuing throughout. Operation completed.

Case 91.—A. R. Local anesthetic; office case. Extreme angular deviation; during operation grew very pale; pulse, 50; vomited. Gave aromatic spirits of ammonia, morphin 1/8, atropin 1/250, hypodermatically and operation resumed and completed.

Case 115.—W. R. T., age thirty-five years; alcoholic; general anesthetic. Ether badly tolerated and would not render patient unconscious. Changed to chloroform and gave morphin sulphat 1/4 gr., atropin sulphat 1/250, hypodermatically; cyanosis developed; heart and respiratory failure. Oxygen and strychnia given; long hard operation; two and one-half hours; delays from cyanosis and hemorrhage. Result good.

Case 125.—O. W., young girl. In beginning operation, cried and was very nervous and finally fainted, but was put in recumbent position and given ammonia and recovered. Operation completed.

Case 128.—C. S. R., Hindu; local anesthetic; acted badly on heart, causing frequent syncope and inability to stitch a perforation produced in attempts to remove perpendicular plate.

Separating Mucosa Alone Without Perichondrium. Case 3.—L. B.; office case; local anesthetic. First incision not deep enough, got in between mucosa and perichondrium. I

discovered my mistake and rectified it, proceeding as usual to proper completion. No bad result.

Split Cartilage. Case 98.—I. L., white, age eighteen years; clinic; office case; local anesthetic. Found triangular cartilage split with a narrow space between the separated portions. Incision right nostril; took out first layer of cartilage; then the second. The operation otherwise pursued the usual course.

COMPLICATIONS FOLLOWING OPERATIONS.

Hemorrhage (Continuous Hemorrhage). Case 1.—H. B.; office case; local anesthetic; bled freely immediately following operation; controlled by ice bag and pressure and recumbent position.

(Secondary Hemorrhage.) Case 17.—Rev. C. Cranked auto on third day after operation, starting hemorrhage from nose. Two stitches had been removed two days previous. I was obliged to pack anterior and posterior nares at Glendale Sanitarium. Removed packing on following day and no recurrence of hemorrhage.

Perforation. Case 24.—W. D., syphilitic. Two weeks subsequent to operation developed pinpoint perforation in the incision site; no symptoms complained of. Put him on potassium iodid. Perforation persisted. Wassermann positive.

Abscess, Separation of Flap. (Separation of flap on side opposite incision.) Case 9.—A. B. 2. Abscess formed between flaps. First, the flap in the incision side healed fast by first intention. Probe passed into abscess evacuated broken down blood and pus. Washed out with salt solution and applied Simpson compressed cotton splint daily; result, healing in seven days.

Case 102.—R. S.; acidosis with acetone and sugar in the urine. General anesthetic. Abscess between flaps. Evacuated by probe and healed nicely in five days.

Hematoma. Case 35.—Miss J. F. Small hematoma. Operation for removal of V-shaped deflection on the left side. (Course of this operation described under another heading.)

Reoperation. Case 7.—P. W. B. Not enough septum removed at first operation; second operation incision high up in region posterior to the first operation. Removed all of perpendicular plate of ethmoid. Good result.

Case 41.—S. H. First operation four years ago by clinician of Los Angeles. Perforation followed. Has stuffed nose yet, due to deviation, high up in ethmoid region, and swollen turbinates. Perforation is the size of a small navy bean in anterior part of nose through columnar cartilage. Whistles when inhaling through nose. Reoperation August 16, 1916; Clara Barton Hospital. Incision rear of perforation; separated mucous membrane and periosteum, and removed deviated bone, but could not close perforation, because there was not enough tissue.

Case 49.—J. H. First operation May 9, 1917. Healing slow and operation site red and puffy. Second operation May 22, thirteen days after the first. Removed fragment of bone (vomer) one-half inch square, left between flaps at first operation; one stitch. Healing prompt; good result.

Case 60.—Mrs. E. L., age thirty-five years; Mendocino County, California. Unusual operation, begun posteriorly. Personal history: Catches cold easily and has severe headaches and pain beginning over the left ethmoid region and extending to the left frontal and becoming general. Much sneezing; mucopus nasal discharge from the left nostril. Examination: Pharynx, negative; larynx, negative; nose, left middle turbinate touches septum. A sharp shelf or spur meets the middle turbinate at the junction of the anterior and middle third of the turbinate. The extent of occlusion is not visible. Operation February 1, 1916, removed tip of left middle turbinate with snare; under local anesthetic at the office. Some relief followed, but not entire. Reoperation February 19th, after consulting with Dr. Lund. Local anesthetic; commenced to remove rest of turbinate remaining after operation of February 1st. Began with Struycken's forceps to cut groove for snare wire, but struck hard bone. Investigation showed it to be septum at junction of vomer and perpendicular plate of the ethmoid. Having cut into this, I began to strip off the mucous membrane from the bone, enlarging my incision along the deviation. Working forward, I elevated the mucous membrane for a distance of one and one-half inches; then with chisel held horizontally, cut through the bone below and above, when I was able to remove it by the forceps in one large and several smaller pieces. The middle turbinate was not at-

tacked, as after the resection there was no contact, but a space one-fourth inch wide between the septum and turbinate. Put in one stitch to close the incision; dressing of Impermeaphane next to the incision wound, and gauze and vaseline. February 20th, dressing; stitch out. Union first intention partly; February 23rd, dressing; slight amount of slough of lower flap. March 15th, complete recovery. Wound is O K. All headaches gone; no sneezing; no pain since operation. July, 1918, called on me and reported she was still free from pain.

Case 123.—M. W., age thirty-eight years, tailor; clinic; office case. First operation in New York City without relief. Reoperation October 13, 1913; incision right side, outside of old scar tissue; difficult dissection on account of the scar tissue. Removed all of perpendicular plate of ethmoid. No complications; good result.

ACCIDENTS DURING OPERATION.

1. Hemorrhage.—Five cases, as follows: Cases numbered 10, 33, 69, 119, 120.

2. Perforation.—Twelve cases, as follows: Cases numbered 16, 21, 32, 34, 35, 53, 54, 67, 96, 112, 124, 128.

3. Syncope, Mild.—Four cases, as follows: Cases numbered 47, 51, 64, 89.

Syncope, Severe.—Five cases, as follows: Cases numbered 25, 91, 115, 125, 128.

4. Separating Mucosa Alone Without Perichondrium.—One case, No. 3.

5. Split Cartilage.—One case, No. 98.

COMPLICATIONS FOLLOWING OPERATIONS.

1. Hemorrhage.—Two cases, as follows: Cases numbered 1 and 17.

2. Perforation.—One case, No. 24.

3. Abscess, Separation of Flap.—Two cases, as follows: Cases numbered 9 and 102.

4. Hematoma.—One case, No. 35.

5. Reoperations.—Five cases, as follows: Cases numbered 7, 41, 49, 60, 123.

6. Acidosis.—One case, No. 102.

The use of the shot and silk suture or the perforated lead plate in the nose does away with much of the tiresome tying

of knots; and tying knots in a nostril is a very difficult task. The shot should be of No. 1 to No. 4 size, smooth, soft, not chilled, so as to compress easily, and should be deeply cut at least half through with a sharp knife.

Putting in a stitch with slotted shot takes from one to five minutes; I have often spent from five to forty-five minutes with needle and tying knots. The silk suture should be threaded on two straight needles. The first pushed through the tissue at the edge of incision or perforation into the other nostril; there the point is seized and the needle is pushed through. The other end, threaded through a similar straight needle, is passed through; the two needles removed and both ends caught in one shot; or two shot, one for each end, may be used. Where there is tearing of flaps, I use a thin, perforated lead plate in that side and pass the suture through it for retention.

In cases of blocked ethmoid region, or ethmoid sinus disease due to retention and proliferation in the germ laden secretion with loss of smell, pain, headaches, and pus discharge, due to blocked drainage from a deviated septum, a carefully performed submucous resection of the septum will often meet the indication; and furthermore, in the light of conservation of mucous secretive surface, will rob the nose of its important structures, as would be the case in removal of the middle turbinate and ethmoid cells. (Refer to Case 60, E. L.)

DESCRIPTION OF DRESSING.

The dressing I have adopted, after trying others, consists of a single layer of Impermephane, a tissuelike celluloid, transparent, very thin and smooth, which does not adhere to the cut surface—laid over the incision or over tears or perforations. On this is laid three to six pieces of surgical gauze, three-fourths inch wide by three to four inches long, depending on the length or depth of the nose. The gauze pieces are saturated with liquid vaseline. In cases where I expect bleeding, I put in a plug of absorbent cotton, soaked in compound tincture of benzoin. This is not easily displaced by the nasal discharges and acts as a dam favoring the clotting of blood. Both sides are plugged. First dressing after operation

is done the next morning. The gauze is removed after soaking with salt and soda solution. The pain of the first dressing, formerly experienced by patients before Impermeaphane was used, is now unknown.

The nostrils are douched thoroughly with salt and soda solution, warm. All clots and shreds removed, and in most cases the stitch or stitches are taken out. In tears or thin mucous membrane, or where there are no contraindications, I often leave the stitch in forty-eight hours. Drainage incisions have been used but a few times, and only in cases where much hemorrhage was encountered during operation.

No redressing with gauze is done, except in cases that bleed freely at the first dressing.

A piece of absorbent cotton loosely compacted, but not firm, and coated with vaseline, is always worn in the nostril for a few days following the first dressing.

Hematoma is subjected to pressure or evacuation with a sterile syringe. Pain after operation yields to aspirin, ice bag or cold compresses. Rarely has an opiate been necessary.

General anesthesia renders the operation harder to perform, lengthens the convalescence, promotes secondary hemorrhage, favors acidosis, because of the starvation, thirst and vomiting, and adds to the shock.

No.	Nasal	Sore Throat	Colds	Nose Bleeds	Mouth Breathing	Sense of Smell	Reoperation	Acidosis	Bronchitis	Deafness	Aviation	Lack of Resonance to Voice	Headaches	Hay Fever	Asthma	Blocked Nose
1	40	6	33	1	29	3	6	102	2	8	22	9	9	11		74
2	40	8	2	103	3	6	72		40	24	21	14	11			64
3	13	13	9		6	56			62	42	22	30	42			2
4	20	20	7		11	41				62	26	40	60			70
5	23	23	8		12	2				80	27	65	71			5
6	30	30	11		17	131				102	28	69	108			77
7	33	33	12		20	60				106	29	98	127			9
8	40	40	13		24					123	32	116				10
9			14		25					124	36	122				81
10			15		26						45	85				11
11			16		27						46					82
12			17		28						47					12
13			18		29						50					83
14			19		30						51					13
15			20		31						52					84
16			21		32						53					14
17			22		33						54					85
18			23		34						55					15
19			24		35						56					86
20			25		36						57					16
21			26		37						58					87
22			27		38						59					17
23			28		39						60					88
24			29		40						61					18
25			30		41						62					89
26			31		42						63					19
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VIII.

SOME UNUSUAL CASES MET WITH IN EAR, NOSE AND THROAT SERVICE IN A BASE HOSPITAL.

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ST. LOUIS,

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1. Complete bony occlusion of the posterior nares. Bilateral. Patient white male, twenty-four years old, comes to clinic on account of nasal obstruction. Gives history of having never been able to breathe through either side of nose.

Examination of the anterior nares: Septum, normal; inferior turbinates shrunk as in atrophic rhinitis, and both turbinates present a stippled appearance over the entire surface. The lower border of each turbinate (inferior) bathed in a sticky mucous (nonpurulent) secretion.

Examination of the postnasal space reveals: An entire occlusion of both posterior nares. A small dimpled area in the upper portion of the obstruction gave the appearance of an opening, but the smallest applicator (with the nose cocaine and adrenalized) failed to show that there existed any communication between the nose and the nasopharynx. Light reflected into the nasopharynx could not be seen through the nose.

Treatment: The nose was cocaine and adrenalized, as was the obstruction, and an attempt was made to push a small sphenoid punch through what appeared to be the thinnest portion of the occlusion. The wall was firm in its entirety, and it was necessary to use a small nasal chisel and mallet to break down the obstruction. After an opening was made, the entire obstructing wall was removed with a heavy sphenoid punch. The lower portion of the obstruction consisted of thick bone, and some difficulty was encountered in removing it. Both sides were operated on, in the manner described, at an interval of ten days. Seven months have elapsed since the operation; the patient breathes normally

through the nose, but is troubled with the lower turbinates. Since the nose is functioning, the inferior turbinates have undergone a marked hypertrophy and have lost the stippled appearance as described.

Electrocautery applied along the prominent portion of both inferior turbinates gave sufficient breathing space.

2. Case of patency of the lower extremity of the thyroglossal duct. Patient, white male, nineteen years of age, born in Austria. Complains of chronic discharge from a sinus below the prominence of the pomum Adami. Says a brother was operated on in Vienna for a similar condition.

By gently probing with a small blunt probe, the tract could be followed up from two centimeters below the prominence of the thyroid cartilage to the prominence of the same.

It was explained to the patient that the condition was not a serious one, but he wanted relief from the annoying discharge.

Operation under cocain anesthesia: The tract was injected with methylene blue solution to facilitate finding it in case it was torn in operation. The tract was removed with no difficulty until the prominence of the thyroid was reached, and at this point it was found that the tract was firmly adherent to the cartilage, and it was with considerable difficulty that it was finally removed. Wound healed entirely and patient sent to duty in five days.

3. Case of dermoid cyst. Patient white male, twenty-six years old; complains of chronic discharge from a small sinus in the postauricular fold (left). There presented just behind the auricular attachment of the left ear a small puckering sinus, from which a small amount of seropurulent discharge could be expressed. The skin below the sinus was rough and slightly infected, and the complaint was principally on account of the constant discharge. History was given of having had two operations on the tumor, with no improvement in the symptoms.

The sinus was injected with methylene blue solution, and upon distention was found to be connected with a cavity one centimeter in diameter, which was directly posterior to the external auditory canal wall.

Under cocain anesthesia, the sinus was followed up and was found to open into the sack described. The sack was torn in removing, but the injection of the methylene blue made its complete removal possible. Examination of the interior of the sack revealed small downlike hairs and several small cartilaginous bodies.

The wound healed by first intention and there were no symptoms of recurrence after two months.

IX.

THE IMPORTANCE OF MORE INTIMATE COOPERATION BETWEEN THE VARIOUS SPECIALISTS WHO SEE NEUROSURGICAL CASES.*

BY ERNEST SACHS, M. D.,

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SCHOOL OF MEDICINE,

ST. LOUIS.

All of us recognize that the constantly increasing range of medical knowledge has necessitated specialization and that we probably have not yet reached the limits of specialization. The modern desire for efficiency as well as the increase of medical knowledge has been a potent factor in this metamorphosis of the physician from a general practitioner to a specialist.

This profound change has unquestionably had its drawbacks. The old family doctor with kindly eyes peering over gold rimmed spectacles with his frock coat and carrying his inevitable black bag is rapidly disappearing, and in his stead has appeared the modern medical efficiency expert, perhaps also with glasses, but shell ones now, trained to such an extent that his resemblance to the physician of twenty-five years ago can hardly be discovered.

As a result we are growing apart, and some of us hardly have common ground for discussion. This is particularly unfortunate if we are called upon to see cases which necessitate the intimate cooperation of various specialists. I know of no cases which present this situation more strikingly than the neurosurgical ones.

The men concerned are the surgeon, the neurologist, the ophthalmologist, the rhinologist, and the otologist. What is the attitude of these various specialists as regards a neurosurgical case? In discussing this, gentlemen, some of you may find me brutally frank; but I trust that no one will find me

unfair and that everyone will recognize that my purpose is to achieve better results than we have had heretofore.

First, the surgeon: What are his sins of commission and omission? When the general surgeon has a neurologic case brought before him, he usually feels, though he may not like to admit it, like the amateur woodsman who has been wandering for hours through the woods, oblivious of the rapidly setting sun and then suddenly finds himself overtaken by the night without a trail, and wanders about aimlessly, getting deeper and deeper into the thicket and not knowing enough to stop and wait for light and help. The surgeon does not feel as much at home with such a case as in an abdominal case. The diagnosis has been given him; he does not know enough neurology to work the case out for himself. The differential diagnosis between a hemiplegia in which the paralysis of the face is more marked than that of the leg and one in which the leg is more affected than the face, does not worry him—indeed, he may not note the fact. The various types of visual field disturbances are of little interest to him, nor would he even raise his eyebrows in surprise if he were shown a visual field with a small sector, about fifteen degrees wide, in the upper quadrant of one eye in which the patient was totally blind. And if the patient told him that when he plays golf and steps up to the tee to drive, he sometimes feels as if he were going to fall forward, he probably would feel sorry for the patient that his "stance" is so poor, but I doubt much if he would think this of any diagnostic value other than as to the quality of his patient's golf game. Yet each one of these symptoms should have been enough to indicate to the surgeon where to operate and how to plan his operative procedure. In the first instance, that of the hemiplegia, he should direct his attack at the center most affected, and very possibly, when the leg is more involved than the face, he would do well to keep his hands off entirely, because the pathologic lesion is probably a longitudinal sinus thrombosis. The visual field disturbance of this patient should have told him that the lesion lay low down in the temporal lobe, where a group of fibers passes which supplies that portion of the retina exclusively, with which the patient sees that portion of the visual field. And the tendency to fall forward should have

warned him that in searching for the patient's cerebellar tumor he must be prepared to go through the vermis in order to reach the anterior surface where the lesion is located.

Now can we expect that a general surgeon shall know the minutiae of neurologic diagnosis when he has so many other problems in the broad range of surgery? It is too much to ask of anyone now, and yet the overworked general surgeon is expected to give such cases as good service as he does his abdominal cases. Such cases require much time for study, and the surgeon ought to be the one to plan and outline the treatment. It is for him to decide whether his attack should be directed at the arm or leg center, and he must know where these centers are located and not have a neurologist who cannot possibly know the surgical aspects of a case decide where he should open the skull. And when he has exposed the brain, if he wants to stimulate the cortex, he must be the one to carry out this procedure and know his physiology so well that he can interpret the results of his stimulations.

In other words, a surgeon to do neural surgery intelligently, ought to have a thorough knowledge of neurology and the physiology of the nervous system.

Next we turn to what I like to call the medical neurologist—that is, the neurologist who is not tainted by surgery. What is his attitude towards these cases? He works up his case and determines that the patient has a lesion in a certain region and then all too often, I fear, he hesitates, procrastinates, and in spite of that, feels elated, even exalted, by the accurate localizing diagnosis he has made. Why do the neurologists, who certainly are a class of as conscientious and devoted physicians as we ever meet, and have the interest of their patient at heart, take this attitude, and are they justified in doing this? How many times has every neurologist been doomed to disappointment because he sent what he felt was a promising case to the surgeon and yet the patient succumbed? Many such experiences inevitably discourage the neurologist, but let him stop to consider the trials and tribulations that the internist went through with his gastric ulcers and carcinomas of the stomach until the surgeon had perfected his technic and the roentgenologist had come to the rescue so that these cases could be sent to the surgeon while still operable. Even

though he may continue to have some disappointments he must follow the sound principle that the moment he suspects a case might be surgical, he should get the opinion of an operating neurologist who will study the case from a somewhat different angle. The results with these cases have improved surprisingly in the last years. The sooner we recognize the need of exploratory craniotomy and that multiple operations give better results rather than an operation in which all is done at one sitting, the sooner will we change the entire complexion of this situation. Then, too, the neurologist must be readier to make a tentative diagnosis of brain tumor in the absence of the time honored triad of headache, vomiting and choked disc. It is still too often the case that a neurologist will hesitate to make such a diagnosis if no choked disc is present; accumulating experiences, however, show that interference with the flow of the cerebrospinal fluid is the greatest single factor in the production of choked disc. Once having made the tentative diagnosis he should give up the prolonged use of iodids and mercury, which for so many decades has been the favorite form of treatment. The fewest intracranial new growths are due to syphilis. The idea, however, that syphilis, in a large number of cases, is the cause of the intracranial lesion has led neurologists to give patients specific treatment, even if the Wassermann and the other serological tests were negative. Not only have they done this, but they have carried it on for many months. We must acknowledge on the one hand that the Wassermann may be negative and the patient still have syphilis; such cases are on record, but on the other hand we must remember that if the case is syphilitic it will respond promptly to antisyphilitic treatment. With iodids and mercury used intensively, some improvement ought to be apparent in two to three weeks, and unless there is evidence of such a change other methods should be tried. Then, too, a gumma of the dura does not respond to specific treatment as do gummas elsewhere, and furthermore, during the period of treatment the increased intracranial pressure may cause irreparable damage, which might have been avoided by a different handling of the case. A choked disc should always be presumptive indication for a decompression operation, regardless of the underlying pathologic cause. There

are still many cases that are allowed to go on to blindness without any attempt at all being made to relieve them, or the attempt is made too late.

I have spoken rather freely thus far about surgeons and neurologists, as my intimacy with both groups makes me feel more at ease with them, but as I approach the fields of the other specialists, the rhinologist, ophthalmologist, and otologist, I feel the hesitation that is born of lack of intimacy. I shall, however, try to overcome this diffidence.

The rhinologist has his sinuses, which not infrequently give rise to symptoms similar to those due to intracranial lesions, notably headache and eye changes. I have come in contact with the rhinologist in three types of cases:

1. Infections of the sinuses, especially the sphenoid and ethmoid.
2. Trigeminal neuralgia.
3. Pituitary conditions.

The optic nerves lie so close to the sphenoid that they may become involved in an inflammatory process. Whether a true choked disc can be produced is, to my mind, an open question, for according to the best views about choked disc it is due to the forcing of cerebrospinal fluid down the optic sheath. Now, if it does occur, obviously the explanation of the production of a choked disc is incorrect, but this discrepancy, as far as I have learned, has never been considered either by the rhinologist or ophthalmologist.

There are several points about the production of choked disc that are not absolutely settled. Some observers believe that it can never occur unless there is interference with the flow of cerebrospinal fluid—that is, that there is a beginning or potential internal hydrocephalus. This has always seemed to me an extreme view to take, for I have seen cases that had nothing suggesting an obstruction to the cerebrospinal fluid and which still have had a choked disc.

The rhinologist claims it requires weeks to determine whether the eye changes will be relieved by draining the sphenoid, and this adds to the difficulty. Those weeks of waiting may be the crucial ones in the life of the optic nerve. This dilemma constitutes a true Scylla and Charybdis. If we wait to determine the correctness of the sphenoidal theory we may be per-

mitting a choked disc to develop into an optic atrophy, while if we were to do a decompression operation we might be operating unnecessarily. I have recently seen a case which presented this very problem. A woman developed unilateral choked disc of great intensity; in the course of a week's observation hemorrhages appeared. One rhinologist said her sinuses were clear, the other that her sphenoid was diseased, and to add to our misery the otologist appeared and discovered an error in past pointing. The most meticulous neurologic examination was entirely negative. Indeed, even Ulysses never had as hard a time, for he had but two evils to choose between, while we had three.

The second type of case is trigeminal neuralgia.

Pain in the distribution of a part or all of the fifth nerve is a common symptom associated with sinus disease, and if a sinus infection is present that should assuredly first be disposed of, but the patient should first have a neurologic examination, preferably by the rhinologist, to determine if there is any more deep seated cause for the patient's pain. Two conditions deserve particular attention: An intracranial new growth involving the Gasserian ganglion and a posterior fossa process which involves the root of the fifth nerve prior to its entrance into the ganglion. There are a few quite simple signs which will exclude these conditions: (1) Corneal anesthesia. The sensory fibers that supply the cornea are the most sensitive ones in the fifth nerve, and their involvement may be determined weeks in advance of any other disturbance. (2) Paralysis or paresis of the motor branch of the fifth nerve which supplies the muscles of mastication. (3) Evidence of other intracranial symptoms, especially choked disc, or early eighth nerve involvement if the process is in the posterior fossa.

Not one of these three symptoms is found in a sinus process. If the pain, on the other hand, proves to be due to a true tic douloureux, no harm has been done by cleaning up the sinus disease and frequently much benefit may have been derived.

Pituitary conditions, sometimes, are first seen by the rhinologist. I have seen several cases where polypoid masses removed from the nose were really portions of an adenoma of the pituitary. A routine histologic examination would have

shown this. Sinus headaches in the big fat fellows and the little thin fellows may have as their underlying cause hypopituitarism. The slight evidences of pituitary disease have not thus far attracted the attention of medical men as generally as have moderate involvements of the thyroid. Some of the supposed sinus headaches unquestionably are really due to pituitary disease. The location of the hypophysis directly behind and above the sphenoidal sinus explains readily why it may be responsible for headaches quite like those arising from the sinuses themselves. The hypophysis undergoes parenchymatous hypertrophy just as the thyroid does and varies in size normally under different physiologic stimuli. Since it is encased in a cavity closed on one side by bone and on the other by dura, any variation may readily produce increase in tension and headache. Those cases in which the lesion may be produced by hypofunction of the gland may be relieved by glandular feeding.

These slight disturbances of the pituitary may only be determined by a very careful and complete physical examination with X-ray studies of the skull and long bones, and possibly also metabolic studies.

And now, gentlemen, you recall how Ulysses felt when he came upon the island of the sirens and how he had himself tied to the mast in order that he might hear them but not lose his equilibrium. This is about my feeling as I approach the Bárány tests.

There are three points from which to consider these tests:

1. What are these tests supposed to show?
2. Do they actually show them?
3. What is their value in a localizing diagnosis?

As you all know, by turning a patient in a chair or douching the ears the vestibular mechanism is stimulated. By studying a patient's nystagmus, his vertigo, and his past pointing the otologist believes he can determine where in the pathways of the vestibular mechanism a lesion lies.

In order to do this they have been obliged to construct for themselves the anatomic and physiologic pathways through which these phenomena are carried out. In order to do this, they have had to take for granted certain of the pathways which anatomically have not yet been proven; thus they have

assumed that the fiber tracts that control the nystagmus arising from the horizontal canals pass to Deiter's nucleus in the medulla and then up the posterior longitudinal bundle to the eye muscle nuclei; while the fibers from the vertical canals pass up through the pons and then to the posterior longitudinal bundle. The pathway for vertigo arising from the horizontal canals passes from Deiter's nucleus to the cerebellum and then to the cerebral cortex, while that for vertigo from the vertical canals passes to the pons, then to the cerebellum and then to the cerebral cortex. From the cerebral cortex to the cerebellum and thence to that portion of the pyramidal tract controlling the arm passes the pathway which it is claimed controls past pointing.

Of these pathways the one connecting the vertical semicircular canals with a nucleus in the pons has as yet no anatomic proof, nor has the pathway which controls past pointing—the cerebro-cerebellar-pyramidal tract—ever been seen. Now the neurootologist by his tests claims that he can place a lesion in these tracts. A number of cases which I have seen show the danger of such a conclusion, for in these cases the mechanism controlling the vertical canals did not react, while that of the horizontal canals did, consequently it seemed probable that there was a lesion in the pons. Subsequent operation showed that these cases all had an internal hydrocephalus and that the dilatation of the ventricles had pressed on the pathways passing from the pons and thus had caused this symptom. This might be interpreted as proof that the pathway of the vertical canals lies in the pons. More important, however, it seems to me, is the fact that it shows unquestionably that a diffuse process like a hydrocephalus can give focal Bárány tests. Therefore, unless these are checked up with other neurologic evidence, they may be very misleading. In view of the uncertainty existing as to the anatomy of these pathways, how much importance shall we attach to these findings? When these various pathways shall have been proven, of course things will be different, but at the present time we must face the truth and recognize that the neurootologists have gone so far ahead of the anatomists and physiologists that they are in the same position that infantry is unsupported by heavy artillery.

It is my practice in studying neurosurgical cases always to have the Bárány tests made, especially as we are fortunate in having a very careful and critical man in charge of our neuro-otology, Dr. H. W. Lyman. But I always keep in mind that, after all, this examination is merely the examination of one-half of one of the twelve cranial nerves. In view of the uncertainty which I feel still exists regarding the interpretation of the Bárány tests, I use it merely as corroborative evidence—that is, if all other findings are negative, I never am willing to subject a patient to operation when only the Bárány is positive. The case mentioned before of a choked disc, with sinus disease and a past pointing error is a case in point. Here we had the past pointing as the only evidence of an intracranial process. That I do not consider sufficient justification for a decompression operation. My feeling in that particular case was that the sinus should first be opened, as that was the simpler procedure, and all through the convalescence the patient should be repeatedly examined to determine if any nervous manifestations developed. If any did appear, a palliative decompression was to be done to forestall any atrophic changes in the eye.

This leads directly to the problem of choked disc and therefore into the field of the ophthalmologist. Many cases of choked disc first come to him. Now can one tell by the appearance of the fundus what the underlying pathologic process is? In characteristic or advanced cases the pathology may readily be recognized, but the choked disc due to syphilis and that due to tumor are often indistinguishable, and even the changes due to nephritis at their very inception may be quite similar. Some ophthalmologists do not agree with me. I have several times almost come to blows with some of my ophthalmologic friends on this point. I recall on one occasion seeing a choked disc with an ophthalmologist whose name one could conjure with; he insisted the picture was typical of syphilis until he was shown the tumor of the cerebellum.

The ophthalmologist has a peculiar specialty. He is so occupied with a very highly, the most highly specialized sense organ in the body that he sometimes forgets its intimate connection with the nervous system. For example, the fewest men take eye fields with the care that may be desirable for a

neurologic diagnosis, and yet surely the central connections of the visual mechanism ought to interest them as much as the eye itself. Of course, we all know many striking exceptions, such as the de Schweinitzs, Greens and Knapps, but the fact remains that the ophthalmologist does not busy himself enough with the neurologic side of the eye. We want the ophthalmologist to become more interested in the methods of preventing a choked disc from going on to atrophy, and to accept the view that a choked disc, even in the absence of all other symptoms, calls for a decompression operation.

The examples that have been cited bring out forcibly how all important is cooperation in neurosurgical cases.

May I venture to make the following suggestions:

1. That the surgeon must have had a thorough training in neurology, otology and ophthalmology to enable him to make the diagnosis himself and outline the treatment.

2. That the neurologist conceive of the surgeon as his partner in diagnosis and call upon him whenever there is the slightest possibility that the case in point may have a surgical aspect.

3. That the rhinologist, ophthalmologist, and otologist take a greater interest in the nervous system as a whole rather than in that portion pertaining only to their specialties, and that the first two introduce the ophthalmoscope into their armamentarium.

4. That as neurosurgical cases present so many borderline problems a society to which these various specialists belong might do much to bring us all together.

X.

REPORT AND CLINICAL NOTES OF A CASE OF
TOXIC DELIRIUM FOLLOWING MAS-
TOIDECTOMY.*

BY JOHN A. ROBINSON, M. D.,

NEW YORK.

It has been within the experience of some otologists to have a train of psychic disturbances follow a mastoidectomy, which, after a time and under sedative treatment, finally disappears, leaving the patient in a normal mental condition. Among gynecologists this is quite common, but to have a severe dementia succeed an aural operation and persist for months is somewhat rare. The causative factor is usually given in general terms of shock and traumatism.

One would suppose that the free use of the gouge, chisel and mallet in exenterating a mastoid would render abnormal mental conditions more frequent. However, such conditions seem to be uncommon, even in the aural services of large hospitals. The history of the case I wish to report is briefly thus:

On July 24, 1918, I saw for the first time Mrs. L., aged fifty years, married, no children. There was no history of insanity in the paternal or maternal branches of the family. Her previous health was good save for a uterine retroflexion for which she was operated upon in 1910. She was, however, known to her friends as a nervous woman. She was not a drug or alcoholic addict. The illness for which I was consulted dated from the middle of June when, during an acute coryza, she developed an acute otitis, the drum membrane being incised by the family physician. The discharge at first was profuse and purulent, but became scanty after two weeks. For three weeks prior to my examination she complained of increasing headache, pain, mastoid tenderness, moderate tem-

*Read before the New York Academy of Medicine, Section of Otology, October 11, 1918.

perature, insomnia, malaise, and increasing apprehension of her aural condition.

On examination, the canal was found to contain a moderate amount of purulent discharge, slight sagging of the postero-superior canal wall, a sodden edematous bulging drum membrane, with a small perforation in the posteroinferior quadrant. There was moderate tenderness over the mastoid antrum and tip. Bacteriologic examination of the smear showed streptococcus. X-ray picture of the mastoid by Dr. Dixon revealed a cloudy mastoid and breaking down of the cells.

There were no labyrinthine symptoms. I incised the drum membrane, which increased the amount of the discharge and diminished the pain. I recognized the case as operative, but was unable to open the mastoid until July 29th. On the morning of the day she was operated upon she developed a partial facial paralysis of the right side, involving eye, face and mouth. It was this condition that made her consent to operation. For ten days prior to the operation the patient had become increasingly nervous and apprehensive.

I found the cortex of a rather large mastoid somewhat thick and the partially disintegrated cells filled with pus and granulations. There was no sinus or dura exposed. Two days following the operation the patient became somewhat irrational, finding increasing fault with her nurses and her environment. From July 29th to August 6th the psychic disturbance increased, the patient becoming violent at times; and on one occasion she attempted to throw herself from the window of her room. She now developed delusions of persecution, and at times had difficulty in recognizing her physician, nurses and friends. Examinations of her spinal fluid, blood, urine, Wassermann, were negative. All her reflexes were increased, with slight rigidity of her neck. No Kernig or Babinski. She complained of some pain in the operated ear. Five days after the operation she began to have a moderate temperature, ranging from 99 to 102 degrees. There was a tendency for the granulations of the cavity to be flabby. The canal was dry on the tenth day. On the twelfth day the temperature rose to 103°. Thinking that perhaps infected granulations might be the cause of her temperature and the increase of her psychosis, I reopened and curetted the entire cavity, finding soft granu-

lations. During the following week her temperature dropped gradually to normal and remained so during her entire convalescence. She remained at the infirmary all of August. During the major portion of this time her dementia continued, with a tendency to improve. There were days when she was fairly rational and seemed to recover her mental balance; at other times she kept her nurses busy.

The liberal use of bromids, ice, paraldehyde, a daily laxative, colonic irrigations, rest in bed in a darkened room, simple nourishing food, the avoiding of all sources of irritation from noise, visits of friends and relatives, and the judicious timing of dressings were fairly effective in quieting her disturbed condition.

Consultation with Dr. J. Ramsay Hunt confirmed the diagnosis of a toxic delirium. On August 30th, about six weeks after the operation, she was removed to her home. Her mentality had improved sufficiently for her to recognize and chat about familiar buildings and objects in passing. Her facial paralysis gradually became less.

Up to this date she is still irrational most of the time, though her condition shows improvement. Her delusions are principally those of persecution, insisting that those persons about her are concocting schemes for poisoning her, doing her injury, etc.

Conclusions: In studying the history of this case, these factors were brought out: First, the patient had always been recognized as a highly nervous woman and was within a few years of her menopause, and therefore more likely to be stimulated by toxemia of any nature. Second, the delirium developed early in the course of her convalescence. Third, the gouge was not employed except for the removal of the cortex, which was not unduly hard and the cells were easily removable with the curette.

I am inclined to view the case as one due to absorption products from the mastoid. The patient had been in urgent need of operation for two weeks.

The operation, the fear of the procedure, the duration, the discomfort of the drainage, and the postoperative treatment are all possible etiologic factors acting upon a nervous patient.

What measures can we follow to learn the chances of

psychic disturbances after a mastoid operation? First, early operation, if pain is not relieved by prompt myringotomy and appropriate treatment. Second, a technic should be followed which requires the minimum use of gouge and mallet. Third, the use of nitrous oxid in doing the first dressing on a highly nervous patient and subsequent dressings to be made as free from pain as possible. Fourth, a constant surveillance should be maintained over a patient who manifests early nervous derangement, so as to prevent bodily harm. Fifth, to see that the patient is freed from all sources of irritation and that the diet be nourishing, with sufficient elimination. If mental derangement follows in a patient, reasonable assurance may be given that no permanent psychosis will result, although the convalescence may be prolonged.

40 WEST 41ST STREET.

XI.

REPORT OF A CASE OF BRAIN ABSCESS.*

BY ISIDORE FRIESNER, M. D.,

NEW YORK.

The interesting features of this case were the degree and extent to which destructive lesions took place about the vital centers in the posterior fossa with no symptoms.

The patient was an intelligent boy, seventeen years of age, who came to Dr. Phillips' clinic complaining of pain in his right ear from which he had suffered for two weeks. Under local anesthesia, a myringotomy was performed. Two days later he returned. There was a scanty purulent discharge without odor; a good sized myringotomy opening in the posterior part of the drum; no perforation elsewhere, although the boy stated that the ear had discharged before. He had torticollis and held his head inclined toward the diseased ear.

The mastoid was tender and there was slight edema of the tip. He looked sick, his temperature was 102, pulse 110, respiration 22. He was admitted to the hospital and a simple mastoid operation was done at once. The mastoid was pneumatic and very extensive. There were cells and granulations in the groove between the sinus and bulb, internal to the facial nerve. The mastoid was thoroughly cleaned out and the boy was returned to bed.

The following day his temperature was 98.8, pulse 90. The patient made no definite complaint of headache, ate fairly well and his bowels moved. For the next four days the temperature ranged between 98.5 and 99.5. For the first three nights he slept well. The full dressing on the fourth day disclosed nothing abnormal in the bony cavity.

On the morning of the fifth day he vomited and became steadily stuporous; temperature, 99°; pulse, 40. He had involuntary stool and urination.

*Read before the Section of Otolaryngology, New York Academy of Medicine, November 8, 1918.

A careful lumbar puncture was made. The fluid was not under tension, appeared clear, and contained a few pus cells but no bacteria.

When examined at noon time he had a slight sixth nerve palsy on the left side, no paralysis elsewhere, knee jerks increased, bilateral Babinski, no clonus, no Kernig; neck slightly rigid. At times there was a peculiar general rigidity, perhaps cerebellar fit. He slowly became generally rigid, and this was followed in twenty or thirty seconds by complete relaxation. His mental condition precluded pointing tests, etc.

He was prepared for operation and the middle fossa was rapidly exposed. The dura was normal. Not only was the dura normal, but there was no increase in the intracranial tension. The posterior fossa was then exposed; the angle between the middle and posterior fossa was also removed.

At this time the boy stopped breathing but the pulse continued. With the cessation of breathing the conclusion was drawn that we were dealing with a cerebellar abscess, and an opening was made in the cerebellar substance with a brain knife, but nothing was found. However, it seemed so certain there must be a collection of pus in the interior fossa that with a bayonet forceps the region was explored, and when this had penetrated to a depth of about three centimeters an ounce and a half of thick, yellow, nonodorous pus welled up out of the cerebellum. Artificial respiration and the pulmotor were resorted to, of course, but to no avail.

Fearing that an autopsy would not be permitted, the mastoid wound was examined very carefully on the table, but there was absolutely nothing further to be seen. The bone was removed over the lower cerebellar surface internal to the digastric fossa, but the disease had been eradicated in that region. The dura over the anterior surface of the cerebellum as far inside as the internal auditory meatus was examined and no exudate or granulations were found.

Cultures from the mastoid at the first operation showed short chain streptococci; cultures from the brain pus showed similar streptococci with capsule. Blood count: Leucocytes, 26,100; polynuclears, 92 per cent.

XII.

REPORT OF A CASE OF TEMPOROSPHEOIDAL ABSCESS OF RIGHT LOBE.*

BY HUGH BLACKWELL, M. D.,

NEW YORK.

Patient, H. C., age seventeen years, was admitted to the New York Eye and Ear Infirmary March 2, 1918, with the following history: The right ear had been discharging since childhood. During the past month the discharge has been more profuse than ever, and associated for the first time with severe pain over the same side of his head, together with attacks of dizziness and nausea.

Aural examination right revealed the presence of foul pus in the canal and a medium sized perforation in the drum head, posteroinferior quadrant. Audition: Patient was able to hear an acumeter at twenty-five feet and a moderate whisper at the same distance with the affected ear. Left ear normal.

A Stacke-Schwartz operation was performed on the day of admission. The mastoid instead of being hard and sclerosed was found to be soft, containing pus and granulations. During the operation a small area of sinus and dura on the under surface of the middle fossa was exposed. The usual post-operative dressing was applied. The patient made an uninterrupted recovery from the operation and was discharged from the hospital on the fifteenth day.

On March 27th, eleven days after he had been discharged, the patient was readmitted to the infirmary with the following history: Five days previously he had suddenly become unconscious and was carried to Fordham Hospital in an ambulance, from which place he was transferred. Condition on admission: Patient very stuporous and drowsy. Complains bitterly of headache, more marked on right side, of a paroxys-

*Read before the Section of Otolaryngology, New York Academy of Medicine, November 8, 1918.

mal and intermittent character. During the intermissions of headache patient constantly sleeps. Can be roused with a little difficulty and immediately goes back to sleep. No aphasia, no symptoms of meningitis. Spinal fluid was clear, 23 cells, globulins plus, Fehling's plus. Temperature on admission, 98.8; pulse, 46. Just prior to operation pulse dropped to 40 and was hard and incompressible in character. There was no nystagmus. Ophthalmoscopic examination showed a beginning choking of right disc.

Patient was reoperated upon within twenty-four hours of admission. The original postaural wound was split open throughout. The superior end was extended forward and upward a distance of about two inches. From the middle of the postaural wound another incision was made upward and backward for two inches. The anterior portion of the Stacke-Schwartz cavity was then closely inspected and was found to be in a healthy, clean condition. The dura over the under surface of the middle fossa, which was exposed at the primary operation, was then inspected. It was covered with healthy granulations. The bone surrounding this area was removed, together with that portion of the skull which forms the external boundary of the middle fossa, extending upward for a distance of about one and a half inches above the mastoid. At this stage of the operation it was quite evident that the brain was under marked pressure. The external surface of the temporosphenoidal lobe bulged markedly into the wound. A brain knife was then inserted into the center of this bulging area and passed downward, forward and inward for a distance of about one and a half inches, and then turned at right angles. Immediately fluid pus began rapidly to escape along the blade of the knife. The brain incision was then extended to the width of one-half an inch and the knife withdrawn and a groove director passed for an equal distance in the same direction into the abscess. The pus continued to escape until the Stacke-Schwartz cavity had been filled and emptied some twelve times. The interior of the abscess was not probed or sponged at any time during the operation, the brain wound being simply held open until the pus ceased to flow from the abscess. A strip of plain gauze folded once was then inserted into the abscess, about three inches in all

being used. A large wet external dressing of boric acid was employed and patient returned to bed.

On the following day there was a most striking improvement in his condition, mentality quite normal, no headache or stupor, seemed bright and cheerful; pulse up to 66; wound was dressed; abscess discharging freely. During the following week the temperature ranged between 101 and normal, and pulse became normal. Wound was dressed completely every day. On the ninth day patient's temperature rose to 104. He was taken to the operating room. The two blades of a pair of angular forceps while closed were inserted through the wound into the abscess. The blades were then allowed to open. About an ounce of bloody fluid pus escaped. While the lips of the brain wound were held open in this fashion, the interior of the abscess cavity was mopped clean by a large cotton applicator and a rubber drainage tube about the size of a lead pencil and three inches long was inserted into the abscess cavity for purposes of drainage. Spinal fluid at this time was clear; no globulins, Fehling's plus, 6 cells per cm., cultivation negative. Patient lived for nine days after the secondary operation, finally dying eighteen days after the primary evacuation of the brain abscess. No symptoms of meningitis appeared until some twelve hours before death. There was no brain hernia at any time.

Conclusions: First—In abscesses of the right temporo-sphenoidal lobe, occurring in right handed individuals, I again wish to call attention to the absence of any focal symptoms, save those produced by pressure.

Second—In the differential diagnosis between this condition and apoplexy, I wish to emphasize, (1) that the slow pulse of an apoplectic patient is usually increased immediately after any exertion, such as rolling over or sitting up in bed, whereas it is the reverse in brain abscess; (2) the headache of brain abscess is quite characteristic, owing to unusual severity and paroxysmal nature; the headache of an apoplectic being dull and steady in comparison.

Third—The patient did not develop postoperative hernia. I attribute its nonappearance to (a) the comparatively small area of dura exposed, (b) no encephaloscope was used, (c) no counter openings were made into the brain for drainage.

XIII.

CEREBRAL ABSCESSSES OF THE FRONTAL LOBE ORIGINATING FROM THE FRONTAL SINUS AND OTHER INTRACRANIAL COMPLIC- ATIONS RESULTING FROM INFLAMMA- TORY PROCESSES OF THE NASAL ACCESSORY SINUSES.*

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A treatise published in 1916 by Büller on the after-treatment of otitic brain abscesses, comments on the extreme rarity of these conditions and suggests the advisability of collecting statistics upon the subject by a study of numerous case reports.

This statement applies to cerebral abscesses of otitic origin. And yet our knowledge of these abscesses has been considerably extended in the course of the last generation by the studies of a number of eminent authors. In a much greater degree, therefore, will the same statement apply to the rhinogenic cerebral abscesses, for they, as well as all other intracranial complications of nasal origin, are far more rare than the otogenic abscesses. Our knowledge regarding them and, still more, our experience in their treatment are therefore still very incomplete. On this account we assume that the history of some cases belonging to this category will be of interest.

In the Ear, Nose and Throat Department of the Rikshospital I have had occasion to observe, during the last couple of years, three cases of cerebral abscess dependent upon frontal sinusitis. Besides these, there has occurred one other similar case since the establishment of the department twenty-five years ago, thus making four cases altogether.

In the following pages I shall set forth the history of these

*This paper is abstracted almost complete from the *Acta Otolaryngologica*, I, 343, edited by Gunnar Holmgren, Stockholm.

four cases and add a few remarks regarding these abscesses, especially as to their diagnosis and treatment.

Moreover, I shall give an account of the other intracranial complications due to the accessory sinuses of the nose that have occurred in the ear, nose and throat department, and finally I shall relate the history of a case belonging to this class, from another source, which has been kindly placed at my disposal.

I.—ABSCESSSES IN THE FRONTAL LOBE.

Case 1.—Ragnhild, E., nineteen years old; admitted on the 29th of April, 1899; died on the 4th of May, 1899; hitherto always in good health. During the last six weeks had severe nasal catarrh with copious discharge of mucus; no pus or offensive odor noticed. Eight days ago she had severe headache with chills, and she was languid and unfit for work. Has been in bed for the past three days. During the last couple of days she has noticed pus in the discharge from the nose. Headache became violent and was localized to forehead; frequent vomiting. Yesterday some swelling was observed over the eyes and in the eyelids.

Condition on April 29, 1899: Pale; complains of pains in the head; somewhat stuporous; pulse, 108; temperature, 40.1 C.; tongue, dry, with white coating; slight tenderness on pressure on the upper part of the bridge of the nose and over the right eyebrow; no changes in the skin. On rhinoscopy, pus is seen between the concha media and septum as well as external to and under the concha media on both sides. The mucous membrane on the concha is congested and somewhat hypertrophic, especially on the anterior part of the concha media. Urine: Trace of albumen. The anterior part of the concha media was removed on both sides with cold snare and conchotome: there came a quantity of pus.

April 30th. Temperature, 40.1 to 40.0 C. Hardly slept at all during the night; somewhat drowsy; complains of pains in the forehead; dizziness; no vomiting; movement of pupils normal; no strabismus. On rhinoscopy, there is seen on the right side yellowish white pus, which after removal reappears immediately. On the left side there are seen only some yel-

lowish white masses. On exploratory lavage of the antrum of Highmore no pus was found.

Operation with use of chloroform as anesthetic.

A vertical incision was made from the middle of the forehead to the upper end of the bridge of the nose. At a right angle to this incision a horizontal incision was made from the boundary line between the inner and the middle third of the right eyebrow to the corresponding point on the left side. An opening was made in the anterior wall of both frontal sinuses as large as the tip of the finger. Both sinuses were found filled with granulations and thick, yellowish white pus, with no offensive smell. Granulations were spread all over the walls and extended down into the canalis nasofrontalis; they were removed with a sharp spoon and double curette. The posterior surface of the bone was found deprived of its periosteum for a space about as large as a 25-öre piece. The channel down to the nose was enlarged and the wound sutured; no tampon, no drainage.

May 1st. Temperature: 39.3 to 38.8° C. Complaints of headache; has not slept; drowsy; pulse, 120.

May 2nd. Lay in a somnolent state yesterday; responded, however, when spoken to, but only sluggishly. Became rather restless in the course of the evening. Slept one and a half hours last night. Lying today also in a semistupor, with closed eyes, answers sluggishly, complains of headache and pain in the lumbar region. Pulse, 84. Pupils equal in size, somewhat dilated. Ophthalmoscopic examination: Dilated veins.

Two attacks of vomiting, one last night and one this morning; no cramps, no stiffness in the back of the neck. The left arm seemed to be paretic, as in spite of repeated requests she could not return hand pressure, whereas she can do so with the right hand. Temperature at 4 o'clock p. m., 38.4° C. Pulse, 72, a little soft. The right upper eyelid was still somewhat swollen, more so than the left one.

5:30 p. m. Operation under chloroform. The anterior wall of frontal sinuses was completely removed. Towards the upper and outer part on both sides were found some remnants of granulations.

On the right side the posterior wall of the frontal sinus was removed for a space about the size of a 1-öre piece, about 1

centimeter from the middle line. The dura was of a dirty yellowish color. On the left side a similar portion was removed; the dura here was of normal appearance.

On the right side a horizontal incision was then made through the dura, whereupon some drops of purulent, dirty grey fluid immediately exuded. On introduction of a "searcher," pus amounting to about one teaspoonful was met with at a depth of about one centimeter. The cavity extended backwards for about three centimeters. The walls are somewhat softened; no firm membrane. The cavity was carefully curetted with a sharp spoon and a drainage tube and iodoform gauze plug inserted. Pulse after operation: 84, regular.

May 3rd. Temperature, 38.2° to 37.5° C. Patient was very restless during the whole night and wanted to get out of bed. Answered when spoken to; passed urine in bed; convulsive twitchings in left arm occurred twice; no vomiting; stuporous today; pulse, 112. Mouth drawn over to right side; now and then twitchings of the lower lip, which thereby is drawn over to the right. Left arm seems to be paretic, lying bent in the elbow; on attempting to straighten it some rigidity is observed.

May 4th. During the forenoon of the day previous a state of coma developed. Patient was at times very restless. Pulse was sometimes very frequent (about 120); sometimes slower (about 70). There was no vomiting or cramps; otherwise no change. Yesterday evening at 10 o'clock dressings were changed and drainage tube removed. There was no retention of pus, but considerable venous hemorrhage occurred from the dura, also some bleeding from the drainage tube opening in the brain. On account of the rather profuse hemorrhage no new drainage tube was inserted, only an iodoform gauze plug and bandage applied. Patient remained afterwards in deep coma and died last night at 4:30 a. m. Postmortem refused.

Epicrisis.—In addition to the frontal lobe abscess, it is very probable that meningitis had also been present in this case, even though the symptoms mentioned do not prove this with certainty. The paresis in the left arm is an interesting point, going to show that the abscess or the encephalitic changes had extended a long way backwards. It may, however, also be

explained by assuming meningitic changes around the sulcus centralis.

Case 2.—Alfred, F., fifteen years old, admitted March 8, 1916, died March 30, 1916, hitherto in good health. On the 2nd of March the patient's left eye began to discharge profusely, while at the same time it became somewhat reddened. He is also said to have been feverish, and he had several attacks of vomiting as well as of headache. On the next day there was swelling around the left eye, especially of the upper eyelid. There has been no secretion of pus from the nose, nor was there any complaint of nasal obstruction. Since yesterday (March 7th) the swelling is said to have gone down somewhat and the headache has been less severe during the last few days than in the beginning.

Condition on March 8, 1916: Patient looks rather ill and haggard; no pain at the present moment; pulse, 84, regular, good; temperature, 38° C. (armpit); considerable swelling on left upper eyelid; skin over same red and heated; lower eyelid also swollen, but to a less degree; palpebral fissure almost closed; conjunctiva bulbi et palpebrarum considerably swollen and red; bulbus protruding greatly. The whole swelling feels edematous, pasty, without distinct fluctuation. There was considerable tenderness of the left upper orbital edge, and some edema of the coverings over the glabella and of the right eyelid. On anterior rhinoscopy, pus was seen in the left middle meatus. The mucous membrane on the concha inferior and especially on the concha media on the left side was very much swollen. On posterior rhinoscopy, considerable swelling and redness of the concha media and pus in the middle passage were observed. On transillumination no definable shadow was noted over the antrum Highmori; otherwise normal conditions.

March 8th, evening. Operation with morphin chloroform ether narcosis (Kuhn's intubation). Killian's incision. Integument was found greatly swollen, grayish and gelatinous. A subperiosteal abscess was evacuated by the incision, containing a couple of teaspoonfuls of dirty gray pus, very offensive in odor. The bone over the orbita was exposed for a considerable space. There was found a fine fistula in the anterior part of the lamina papyracea, leading upwards towards

the sinus frontalis. This was small (about 1 cm. in extent) and filled with fetid pus. The anterior and middle ethmoidal cells, filled with grayish granulations, were removed. A part of the concha media was also removed. In making the passage down to the nose a considerable part of the processus frontalis maxillæ superioris and of the os nasale were removed. In the diploetic chambers of the bone above the supraorbital edge were small yellow pus foci, while the bone was somewhat discolored. So much of this latter was removed that the hard sound bone was everywhere reached. Tamponade of the wound as well as a separate tampon down through the nose.

March 10th. Patient has been feeling well since the operation; no pains; highest temperature, 37.9° C. (yesterday evening); today, 36.8° C.; dressings changed; hardly any swelling around the wound; much less protrusion of bulbus; movements of the eye seem to be in the main normal.

March 14th. There has been some increase in the evening temperature, which was 38.1° C. yesterday, today, 38.9° C. The swelling in the soft parts has almost entirely subsided and there was hardly any protrusion of the bulb. The conjunctiva was slightly congested; movement of the eye appears to be normal, except when looking upwards, in which direction it is somewhat restricted. On changing dressings, considerable secretion of pus came from the inner angle of the wound.

March 15th. Morning temperature, 38.1° C.; evening, 38.3° C. At 3 o'clock in the afternoon without any previous symptoms, the patient had an epileptiform attack with general convulsions of about one minute's duration, followed by insensibility, which lasted about ten minutes. A similar attack occurred at 5 o'clock in the afternoon. On removal of tampon after last attack considerable secretion of pus was found present. When the suture was removed and the wound inspected a little pus was found, between the periosteum and the bone at the back in an upward direction; otherwise nothing was noted. A strip of gauze was introduced between the periosteum and the bone at the spot mentioned. Since the patient came in the pulse has been between 76 and 88.

March 16th. No attack since yesterday; slept well; feels well; considerably less secretion on changing dressings.

March 19th. Temperature has gradually gone down, today 37. Pulse has been between 78 and 88.

March 23rd. Temperature on the whole has been normal; highest, 37.2° C. The pulse has become slower; this morning 56, this evening 60. In the course of the last three days he has been drowsy and during these days has had diffused and fairly severe headache. Answers sensibly, but languidly, mostly only "Yes" and "No." No vomiting or nausea. Has hardly eaten anything during the last few days. The pupils are large and react sluggishly.

At 7 p. m., the wound was inspected.

Chloroform was administered, but after getting four grams he became pale and unconscious, and on this account no more chloroform was given. A part of the posterior wall of the frontal sinus was removed with chisel. The bone was found to be thickened and slightly decayed. The dura seemed normal. In the outer part of the frontal sinus a section about 1 by 1 centimeter in size was removed. The remaining part of the orbital roof was found to be denuded of periosteum and covered with granulations. A few drops of pus were found here. A cavity about the size of an almond was reached with the probe. The dura was laid bare in the upward direction and the exposed cavity found full of granulations. The portion of the orbital roof referred to was removed with forceps and the wound cleansed with a double curette and plugged with sterilized gauze. A strip of gauze was introduced downwards through the nose. After the operation the patient stated that he felt relieved. He spoke sensibly. Pulse, 76.

March 24th, evening. Patient slept fairly well last night. Since this morning he has become a little more drowsy. Vomited this afternoon at 6 o'clock. The pulse has again gone down to 56. Temperature, 36.9° C. For this reason an inspection of wound without narcosis was made, with examination of the frontal lobe through the dura corresponding to the frontal sinus. The dura was here found to be somewhat thickened, but without pulsation. An incision about 1 centimeter long was made through the dura, and this was enlarged to 2 centimeters with a blunt instrument. In the meninges there was nothing noticeable. On inserting a Pean's forceps

for about 1 centimeter, there exuded a quantity of yellowish green fetid pus, which filled the whole of the frontal wound, all together about two tablespoonfuls of pus. The abscess cavity was egg shaped and extended backwards for about five centimeters. After evacuation, the cavity was cleansed with gauze and a sharp spoon. A drainage tube, split lengthwise, was inserted, about two centimeters within the opening, and fixed with a safety pin. Sterilized gauze bandage.

March 25th. Less headache since operation. Patient livelier, more talkative. No vomiting. Pulse, 64. Dressings were changed and opening in dura enlarged. Culture from the abscess showed staphylococcus pyogenes aureus (pure culture).

March 26th. Condition the same as yesterday. On changing dressings, considerable secretion of pus noted. Pulse in the afternoon, 52.

March 27th. Drowsy. Complains of headache. Pulse, 58. Vomited after taking orange juice. Some pus was found on changing dressings. Salt water plug instead of drainage tube.

March 28th. Pulse, 52. Temperature rising; yesterday evening, 38.2° C., today 38° C.; vomiting yesterday evening and last night; perfectly clear in mind; complains of headache; twitchings in the left arm two or three times this morning; dressings changed. After removal of tampon and dilatation of abscess opening about one teaspoonful of pus was evacuated. A slight prolapsus in an upward and outward direction, which blocked the passage, was removed. The walls of the abscess cavity are found to have grown together, so that there was no room for a drainage tube. When the tube was inserted into the opening it was immediately expelled. A strip of sterilized gauze was introduced into the wound. Yesterday evening and today the patient complained of pains in the left lumbar region and under the costal arch. Tenderness in the region of the kidneys; kidneys not palpable; urine dark, cloudy; specific gravity 1,026, contains a little albumen, reacts strongly to blood test, no pus or sugar. Microscopic test: numerous red blood corpuscles, renal epithelium, conglomerate and separate blood corpuscle fibrines.

March 29th. Pulse, 56. Temperature, yesterday evening, 38.3° C.; today, 38.4° C. Yesterday evening repeated attacks of vomiting. Since the change of dressings yesterday a quan-

tity of pus mixed with blood oozed out from under the bandage. Has slept a little. Headache seems better today. His mind is clear. Takes a little sour milk. There is considerable stiffness in the back of the neck and incipient opisthotonus. On changing dressings today a prolapsus the size of a walnut is seen to have come through the opening in the dura. In the afternoon a puncture in the lumbar region was made, whereby twelve cubic centimeters of rather turbid liquid was evacuated. Beginning pressure, 400 millimeters; final pressure, 250 millimeters. Ten thousand eight hundred white blood corpuscles, chiefly polynuclear leucocytes.

After the lumbar puncture there were less stiffness and pain in back of neck. On removal of the dressings there came away a mass of cerebral matter about as large as the prolapsus previously mentioned, with dark discolorations in several places. Afterwards the patient lay still and quiet and died at 3 o'clock a. m. Postmortem refused.

Epicrisis.—From a sinusitis frontalis (plus ethmoiditis), accompanied by important external symptoms, especially in connection with the eye, an abscess of the frontal lobe developed in the course of a very short time and assumed considerable dimensions. In spite of this abscess being opened, the case came to a fatal issue on account of the development of meningitic complications. The rapid progress of the illness and the dirty gray, extremely fetid pus, seem to point to malignant infection. The occurrence of cramps is especially noteworthy. In the first place there were the two epileptiform attacks, and then there were the twitchings in the arm on the same side as the abscess. Convulsions in cases of cerebral abscess are, of course, nothing unusual, especially in children and young persons. On the other hand, convulsions in connection with abscess of the frontal lobe occurring on the same side as the abscess have been mentioned only by Donalies in a single case, and he was not able to give any explanation of the phenomenon. In the present case it may be due to the meningitis, which at the time the twitchings in the arm occurred—the day before death—must have been fairly extensive.

Case 3.—Peter G., nineteen years old, admitted February 20, 1917, died August 5, 1917. Hitherto in good health. In

the middle of December, 1916, he lay in bed for three days with headache and vomiting. About three weeks ago he caught a heavy cold with nasal catarrh and headache, and remained in bed for five days. The catarrh has persisted since then, on both sides all the time. Last week he was again forced to go to bed on account of severe pain in the region of the forehead. In addition, on this occasion he was taken with repeated vomiting. On the 16th of February he noticed an offensive odor from the nose.

Condition on February 20, 1917: The patient was pale and looked rather run down; pulse, 52, regular; temperature, 37.7° C. (armpit); very offensive odor from nose. The right palpebral fissure was somewhat smaller than the left and the right upper eyelid slightly edematous. There was some tenderness on pressure over the eyebrows, increasing upwards to the middle of the forehead. There was extreme tenderness on pressing against the floor of the frontal sinus on both sides. No edema on the forehead. The septum nasi showed considerable deviation towards the left, so that the upper part of the left nasal cavity could not be surveyed. The mucous membrane of the nasal cavity was hyperemic, bleeding a little. The right nasal cavity was roomy, the anterior extremity of the concha media hypertrophic, pale and coated with pus. Examination of the organs showed nothing abnormal. Urine: albumen negative.

February 22nd. On transillumination a shadow was seen over the left antrum of Highmore. On puncture pus was found. A wide opening of the left antrum Highmori was made from the lower nasal passages. During the following days the left antrum Highmori was irrigated. Under this treatment the swelling around the right eye decreased. Patient got up, but felt weak and still complained of headache. Bowels were constipated. Pulse kept at about 60, a couple of times at 52, on one single occasion (March 3rd) down to 48. Temperature about 38° C.; on one evening 37.5° C.

March 5th. Still complained of headache and great fatigue. Today puffiness around the right eye and swelling of the eyelid were again noticed.

Under chloroform narcosis, radical operation of the right sinus frontalis was performed. Pus appeared at the first

stroke of the chisel on the usual spot, the bone being unusually thin. The mucous membrane in the sinus was edematous and swollen. The cavity, which is about the size of an almond, contained some granulations. Pus was seen oozing out from a very small opening on the posterior wall. After removal of the anterior wall of the cavity and part of the lower wall of the cavity, and after enlargement of the canal down to the nose, where granulations were found, the posterior wall of the frontal sinus was removed. A little pus immediately came out. The dura was found to be thickened, a little yellowish in color, covered with granulations at certain spots. An incision about one and one-half centimeters in length was made through the dura, followed by a puncture with a closed artery forceps, which was accompanied by only a little pus. Introduction of a blunt Pean's forceps, about two centimeters, was followed by an outburst of a large quantity of fetid pus, about two tablespoonfuls. A strip of vioform gauze was inserted in the opening to the abscess without suture. After the operation pulse was 76, and half an hour later, 60. Diplococci were cultivated from the pus.

March 6th. Pulse, 52; temperature, 36.4° C. The opening to the abscess has closed up; the strip of gauze has been driven out. On reopening with Pean's forceps a large quantity of fetid pus was expelled. After evacuating the contents as completely as possible a slightly bent tracheal canula was inserted, being introduced by means of a conductor. The rest of the wound cavity was then plugged.

March 7th. Slept last night without acetocyl, which he had not done previously. On changing the dressing it seemed that the canula had drained well. The abscess cavity was proceeding to close up. On examination with Pean forceps no retention was observed.

March 9th. Temperature yesterday and today, below 37° C. Pulse today more rapid, about 100 (this morning, 64). Yesterday there was severe pain in the forehead, for which morphin was given. The canula had been expelled and the abscess cavity closed; swelling in the forehead and the right upper eyelid was greater and fluctuation present. A subperiosteal abscess was incised and about one teaspoonful of

pus evacuated. The sinus frontalis was filled up by a prolapsus.

Subsequently an attack of erysipelas developed which spread over the whole of the face and neck and down to the middle of the back. This was treated with fomentations. From March 20th the temperature was normal (below 37° C.). From April 5th till May 7th, a little fever (up to 38.3° C.), afterwards again below 37° C. In connection with the erysipelas an abscess formed in the right upper eyelid and a subperiosteal abscess in the forehead on the right side. Both of these were incised. From the beginning of May all secretion had practically ceased. The prolapsus, which had grown to the wall of the frontal sinus, was gradually loosened and an attempt was made to reduce it by careful compression by a bandage. It shrunk to about the size of a finger tip. On the 24th of May the patient began to sit up. On June 8th the evening temperature was 38° C., and he complained of slight headache.

June 9th. An attack of vomiting. The prolapsus appeared a little larger. Evening temperature, 38.2° C.

June 10th. Vomiting. Some headache.

June 11th. On examination with a blunt curved forceps inside of the prolapsus, more than a teaspoonful of somewhat fetid pus streamed out, after which the headache improved, the abscess appearing to be situated in the prolapsus itself. Dry dressings as before. Evening temperature, 37.9° C.

From June 12th, temperature again normal (below 37° C.). Secretion from the opening has almost entirely ceased, the prolapsus again smaller and the headache abated. On June 27th the patient got up again. He felt quite well, temperature normal and pulse between 70 and 90. The pulse, it may be remarked, had not been below 64 since March 6th, the day after the opening of the cerebral abscess.

July 19th. Patient had again a slight headache, and the evening temperature was 38.7° C.; pulse, 108. On the three following days the evening temperature was between 37.6° and 37.7° C.

July 22nd. Vomited in the afternoon.

July 31st. Temperature has remained normal since July 23rd. He has had a little headache and on certain days (July 26th, 27th, 28th, 29th, 31st) an attack of vomiting. On in-

serting a blunt forceps in the opening inwards from the prolapsus which, by the way, was now almost covered by a growth of skin, about half of a teaspoonful of mucous pus was evacuated. After this the patient felt relieved.

August 2nd. Had again a single attack of vomiting, but felt better otherwise. Appetite increasing.

August 4th. Felt quite well the whole day. Ate supper with appetite. Evening temperature: 38.4° C. (after having had for ten days perfectly normal temperature and pulse between 60 and 70). He went to sleep as usual without the attendants noticing anything remarkable. At 1 o'clock he began to moan and immediately lapsed into unconsciousness. The arm and leg on the left side became paralyzed (the face, however, appeared to be unaffected). Pulse, 160. He became by degrees completely comatose and died at 4 o'clock. Postmortem refused.

Epicrisis.—The symptoms of sinusitis frontalis on the right side which were present on the patient's admission temporarily disappeared after the empyema in the antrum on the left side had been opened. Still, the patient continually suffered from headache and felt by no means well. His pulse was also remarkably low. When the patient thirteen days after admission was operated upon for the sinusitis frontalis, the supposition that there existed a cerebral abscess was confirmed by the findings in the frontal sinus. In the posterior wall there was a small opening, from which pus exuded, showing, at any rate, an epidural accumulation of pus. The dura being laid bare also showed alterations that pointed to a more deep seated lesion. And after an incision had been made in the dura large quantities of fetid pus were evacuated by means of Pean's forceps. The case seemed at first disposed to run a favorable course. In spite of several abscesses in the soft tissues and under the periosteum and in spite of extensive erysipelas the patient improved, and two and a half months after the operation he began to sit up. But fourteen days later he again had headache, slight fever and vomiting. An abscess was found and opened, apparently situated in the prolapsus that had developed, although the prolapsus had decreased in size. He improved again and was once more able to get up. But about one month later he got the same symp-

toms again and a fresh accumulation of pus was evacuated. Some few days after this—five months after the original operation—he suddenly became unconscious and died in the course of a couple of hours, showing signs that pointed to a penetration into the ventricle system. The symptoms which preceded the last two evacuations of pus must therefore be assumed not to have been caused by a superficial retention alone. There has probably existed a more deep seated accumulation, extending pretty far backwards. The hemiplegia of the left side which supervened just before death points in this direction. The patient died of a secondary abscess. This is the danger that always lurks in the background, even when a cerebral abscess has been located and opened, and even if there are no other intracranial complications present.

Case 4.—Rolf, K., twenty-two years old, admitted July 14, 1917, discharged September 7, 1917; readmitted September 18, 1917; discharged March 3, 1918.

Suffered from enlarged glands in childhood, otherwise always in good health. Since the spring of this year he has been troubled with nasal catarrh with thick, yellow mucus discharge on both sides, but not accompanied by headache. He became worse during the summer, for which his lying in a tent near a river (military service) had been held accountable. On the 5th of July he had headache, mostly localized to left side of the forehead. At the same time he had pain around the left eye, which on July 6th swelled up very much. The eyelids became red and swollen, so the eye could not be opened. He was admitted to a small country infirmary, where he has since been treated with compresses until today, when a small incision was made in the left upper eyelid but without any pus coming out. This afternoon he was admitted as an urgent case to the Rikshospital Eye Department, from which he was at once transferred to the Ear and Throat Department.

Condition on July 14, 1917. Pale and thin, complains of headache in the forehead and pain around the left eye. Pulse, 92; temperature, 37.5° C. (armpit). On the left side there was considerable swelling in the region of the forehead, and the eyelids were likewise much swollen, red and glued together, so that he could just barely open the eye. In the inner portion

of the upper eyelid there is a hard patch of limited extent, not fluctuating, in which may be seen the small opening from the incision. Some tenderness along the *margosupraorbitalis*, mostly in the medial portion. Considerable chemosis conjunctivæ. Cornea clear and mirror like. Bulbus greatly protruding, immovable and displaced in a downward and outward direction.

Anterior rhinoscopy: The mucous membrane of the nose was swollen and congested; on the right side the concha media partially coated with half dried, thick yellow mucus; on the left side pus seen both in the middle nasal passage and in the olfactory region. On posterior rhinoscopy the same conditions were observed. The septum was found to be deviated to the left, so that in the upward direction it almost touched the lateral wall.

Heart and lungs: Condition normal.

July 15th. Radical operation upon the left sinus frontalis, under morphin ether narcosis (Kuhn's intubation).

Integument was much swollen and edematous. The sinus frontalis contained a considerable quantity of yellow pus, the mucous membrane being greatly swollen. The cavity extended outwards only to the middle of the eyebrow, but pretty far upwards and especially far over towards the right side, where its boundary coincided more or less with the center of the right eyebrow. Between the sinus frontalis and the orbit there was a large ethmoidal cell filled with pus. The whole of the ethmoidal labyrinth was full of swollen, polypoid mucous membrane, which was removed. A wide communicating passage was made down to the nose, in making which a considerable part of the lateral nasal wall had to be removed on account of septal deviation. No penetration of the bone was anywhere noticed. A strip of sterilized gauze was introduced from the cavity down through the nose. Primary suture. On July 16th, the evening temperature was 39.8° C. Later there was normal temperature, rising occasionally in the evenings to between 37.3° C. and 38.3° C. During the whole time he was in the hospital the pulse remained as a rule between 72 and 80, never slower than 72. During the first month after the operation he complained a good deal of headache and gave the impression of being rather peevish and cross. On August

12th he had a single attack of vomiting after eating. The swelling around the eye gradually diminished. There continued, however, for a long time a puffiness in the upper eyelid beneath the operation wound, where an abscess was lanced on August 14th and about half a teaspoonful of thick yellow pus was evacuated.

On the 7th of September everything had healed up. There was still some discharge from the nose. The patient felt well; his weight increased 6.7 kilograms from July 25th to September 4th. Discharged.

On September 13th he became suddenly very ill, had severe headache localized to the left side of the forehead and to the back of the neck; since then he has been confined to his bed. On attempting to get up he became very dizzy. On September 16th he had an attack of vomiting, likewise on the morning of the 18th. On September 18th he was again admitted to the same department of the hospital in a condition of great suffering and moaning with pain. The left eye and its surroundings were in the same state as when he was discharged. No conspicuous tenderness. No distinct stiffness of the neck, but the patient winced when the head was bent forward. Kernig positive (which disappeared after injection of morphin). Pulse, 64; temperature, 37.8° C.

Immediately after admission an operation under morphin novocain anesthesia was performed.

Incision through the old scar, also a vertical incision about two centimeters in length upwards from the inner end of the first incision corresponding to the internal canthus. The sinus frontalis contained only a quantity of fibrous tissue, and there was no change in the bone in the wall of the cavity. The dura was laid bare for a space about the size of a 10-öre piece by removal of a portion of the posterior wall of the frontal sinus. The surface of the dura showed no distinct changes. It was taut, pulsating, and seemed to bulge somewhat forward. On puncture with a thick needle pus was encountered at a depth of about one and a half centimeters. Thereupon about 35 c. cm. (carefully judged) of thick yellow odorless pus was evacuated very slowly and carefully. A split drainage tube was inserted about one cm. from the surface and was sutured

to the lower corner of the wound. Dry dressings. Patient stated that headache was relieved after operation. Pulse, 72 to 76. Diplococci were cultivated from the pus.

September 19th. Has been feeling well. No vomiting. A bloody liquid has soaked through the dressings. The drainage tube lay outside the opening in the dura. On separating the edges of this opening by means of a forceps two or three teaspoonfuls of matter were evacuated, consisting partly of a quite thin fluid, slightly mixed with blood, and partly of small purulent masses. A strip of sterilized gauze was carefully inserted in the opening of the dura. The walls of the cavity of the abscess seemed to have come together, as the forceps met with a soft substance immediately inside the opening.

During the following three or four days a similar amount of matter was evacuated in the same manner. Afterwards the secretion from the opening in the dura was very slight. The dressings were changed daily, and the edges of the opening were separated each time by means of a forceps. The opening in the dura closed up one month after the operation. During the after-treatment, the part of the wound corresponding to the exposed portion of the dura gradually bulged out more and more, in the form of a hemispheric tumor, covered with granulations. This protrusion attained its greatest dimensions six weeks after the operation. It was then about as large as a walnut and rose a little above the level of the frontal bone. Afterwards it gradually subsided and disappeared about two months after the operation. The wound continued to show slight secretion for a long time, but by the middle of December it had become covered with skin. The pulse was never slow after the operation, generally about 80. The temperature during the first sixteen days after the operation showed occasional slight increases in the evenings up to 38°C . Afterwards it became normal (below 37°C .). On December 11th he got up. On the two following days he had an evening temperature of 37.4°C . and 37.3°C ., so he went to bed again. Slight increases in the evening temperature continued until December 19th, after which there was no fever. Got up again on January 1, 1918. Subsequently he was entirely without fever, with the exception of two short periods of temperature, which could not be attributed to his original malady (from

January 23rd to 26th, pain in joints accompanied by fever, and on February 11th and 12th, angina accompanied by fever).

The patient's general condition and appetite were, generally speaking, excellent after the operation. When weighed for the last time on February 5th, his weight was 80 kg.—that is to say, he had put on 6.2 kg. more since the date of his discharge after the first stay in the hospital.

On February 12th he was discharged. The operation scar was then firm and solid. In the upper part of the nasal cavity on the left side there was an inconsiderable quantity of half dried secretion. There was still some alteration in the eye; the bulbous protruded a little and was displaced in a downward and outward direction, with double images in the left hand and upper portion of the field of vision. (Paresis of the rectus superior, together with contraction of the rectus inf.—Rikshospital's Eye Clinic.)

Reexamination, on April 19th: Feels perfectly well. No secretion found in nose. Examination of eye (Rikshospital Eye Clinic) showed normal power of vision. Left papilla a little paler than the right one. Otherwise as stated above.

Epicrisis.—The treatment, as may be seen from the history of the case, was very conservative. This conservative procedure was based upon a line of reasoning which was arrived at under the impression drawn from the progress of the two previous cases and was as follows:

When an inflammation proceeds from the frontal sinus to the brain through the meninges and the result of this is an abscess—that is to say, a limitation of the pathologic process in the brain, this may be regarded as the beginning of an effort on the part of nature to cure itself. The consolidations in the tissues that have taken place and the formation of a more or less distinct membrane may be regarded as a protective barrier for the surrounding brain tissue. It is now the business of the surgeon to meet the efforts of nature half way and to secure an outlet for the pus with a minimum of traumatism and infection of the healthy brain tissue. The drainage of a cerebral abscess is generally established either by means of a drainage tube or by inserting a tampon in the abscess cavity, with or without lavage. In each case there is a certain amount of risk of lesion or infection of the surrounding tissue with

consequent encephalitis and meningitis. It is therefore doubtful whether it is expedient to employ the same thoroughgoing, but sometimes violent, method as is used in the treatment of abscesses in other parts of the body. It may be that it will be better for the patient to confine oneself to securing free passage for the pus every time the dressings are changed and in the meantime only to leave a small tampon lying in the opening in order that the latter may not close up.

The fact that the course of the malady in this case was favorable is one more proof among many of the wonderful healing powers that nature possesses. On the other hand, it is, of course, dangerous on the basis of a single case to draw far-reaching conclusions with regard to the treatment of such abscesses. I shall, however, later on revert to these questions.

FREQUENCY.

An abscess of the frontal lobe complicating a sinusitis frontalis is a rather uncommon thing. Nevertheless, this complication arises considerably more frequently than was thought about twenty years ago, to judge from existing literature. The statistics regarding intracranial complications in connection with affection of the accessory sinuses are, as Onodi remarks, by no means to be regarded as complete. It cannot, however, be denied that they are of great interest.

In 1896 Dreyfuss could not classify more than nineteen certain cases altogether of sinusitis frontalis accompanied by intracranial complications. In 1908 the same author was able to increase that figure to 88, and of these 36 were abscesses of the frontal lobe. In 1909 Gerber found in the whole range of medical literature sixty-six cases of such abscesses mentioned. And finally, in 1914, Boenninghaus was able to state that the number of published cases of abscess of the frontal lobe arising from this cause was eighty-seven. As may be seen, the number of published cases has increased indeed, but is as yet by no means particularly large.

SYMPTOMS AND DIAGNOSIS.

All authors emphasize the fact that the symptoms of frontal lobe abscess are not very distinctive and that therefore the diagnosis is generally very difficult. Gerber in his exhaustive

work "Die Komplikationen der Stirnhöhlenentzündung," begins the chapter on the symptoms of these abscesses with the following pointed remark: "The common symptom of frontal lobe abscess is its absence of symptoms."

The division into four separate stages: the initial stage; the latent stage, the manifest stage, and the terminal stage, which is made in the case of otitic cerebral abscesses, it also employed in the symptomatology of frontal lobe abscesses. But in respect to the latter it is still more difficult to differentiate the different stages than in the case of otitic abscesses. This is especially due to the fact that in the case of cerebral abscesses arising from an inflammation of the frontal sinus focal symptoms are hardly ever to be seen. In the case of brain abscesses of otitic origin there are, on the contrary, frequently symptoms in the manifest stage which determine the location of the abscess and confirm the diagnosis of its existence. So important is this that Körner, when discussing the diagnosis of otitic brain abscesses, begins by mentioning the focal symptoms which are of significance for differential diagnosis between temporal lobe abscess and cerebellar abscess. In regard to otitic abscesses there has been considerable advance made in the diagnosis in recent years, since Bárány has proved that in the cerebellum there exist centers which govern the movements of the joints in the different main directions and that paralysis or irritation in these centers may be clinically ascertained by means of the pointing tests.

The conditions as to frontal lobe abscesses are different. In these cases as a rule no focal symptoms are to be found. Such symptoms do not appear until the abscess has become very large and begins to extend in a backward direction. Thus in certain cases of facial paralysis, strabismus, as well as motor and amnesic aphasia have been described.

Hammerfahr's case is justly famous. In combination with sinusitis frontalis on the left side symptoms of brain pressure developed, paresis of the oral part of the facial nerve on the right side and partial amnesic aphasia. An abscess was diagnosed in the posterior part of the lower frontal convolution. On operation the abscess was found at the spot mentioned, two centimeters below the surface of the brain. It contained about one tablespoonful of pus. The patient was cured.

An interesting case, which bears some similarity to this, has been published from Holmgren's hospital.

A twenty-five-year-old woman developed symptoms of an intracranial complication in combination with acute sinusitis frontalis et maxillaris on the left side. After evacuation of an epidural abscess the symptoms temporarily subsided. But a week later paresis in the left arm appeared, and after some days this developed into hemiplegia. A deep seated abscess in the right parietal region was diagnosticated. On trephining over the right parietal lobe a large abscess was found at a depth of 3 cm. In spite of the opening of the abscess the patient's life could not be saved. A postmortem revealed a large abscess in the tract of the capsula interna. No connection with the epidural abscess could be discovered, for which reason the abscess was regarded as being metastatic.

In general, in making the diagnosis, we must be content with the etiology of the case (the sinusitis), combined with the more or less distinct signs of intracranial pressure. In this way diagnosis has in many cases been successfully made. But this nearly always demands a certain time for observation. And often the mode of procedure in the first place is to operate for the sinusitis. If the symptoms do not disappear, as had been expected, if they continue and increase, it gradually becomes clear that there exists something more than an inflammation in the frontal sinus and then finally the cerebral abscess is diagnosed. Such a state of affairs is so typical that on reading through the history of cases we find these conditions recurring again and again almost with the regularity of a law.

I shall discuss the most important symptoms, and in judging their value I shall lay special stress upon what is to be learned from the cases already described, and as far as possible shall endeavor to utilize the information I have gained from these three cases which I have personally observed.

Headache is, of course, a symptom that is very common in the most dissimilar forms of disease. This symptom might therefore be considered as being of little importance to support the diagnosis. It is especially hazardous to attach too much weight to headache, because it is a symptom that also belongs to the original disease, the sinusitis, and yet, from

what I have seen, this symptom is of considerable value. Not, however, on account of its localization, for that is not a characteristic feature. Frequently, no doubt, the pain is situated in the region of the forehead, but it may also be localized to the back of the neck or it may be diffused.

But what frequently distinguishes this headache is its severity. Among patients with uncomplicated sinusitis frontalis I have never noticed anything like such violent headaches as in the case of the three patients suffering from frontal lobe abscess whom I have observed.

Practically speaking, the question whether an existing sinusitis has led to an intracranial complication now hardly ever arises before the pus in the frontal sinus has been removed by means of an operation. If a violent headache exists afterwards it points in the direction of an intracranial complication.

The nature of the complication is, no doubt, often difficult to decide with certainty. We meet here similar diagnostic difficulties as in the case of otitic complications. It must, however, be remarked that the cerebral abscess is the intracranial complication that most frequently arises in connection with sinusitis frontalis. Besides, in the case of meningitis and of the rarely occurring thrombophlebitis (in the sinus longitudinalis et cavernosus) we have other symptoms which are of more or less decisive importance for differential diagnosis. And, finally, epidural abscess, especially when it has attained certain dimensions, may occasion symptoms that are quite similar to those of the cerebral abscess. A confusion between these two may therefore very easily occur. It must, however, be remembered that epidural abscess as an independent disease is much rarer in occurrence. Besides, there is no doubt that a very severe headache and a serious general condition should rather lead us to suspect the existence of a cerebral abscess. However, the differential diagnosis between these two diseases is not of great practical importance. The situation becomes clear at the operation.

While considerable diagnostic significance may be attached to an intense headache, it must not, on the other hand, be forgotten that the headache may not be a very prominent symptom. We may count upon this being the case if the

abscess is small or if it has secured an outlet through a fistula. Thus in the case of Rafin's patient, where the abscess had an outlet through a fistula in the upper eyelid, the headache occurred only when the fistula was closed. When it was open there was no pain.

Slow pulse is another important, but unfortunately far from constant, symptom in connection with cerebral abscess. This symptom enjoys, if I may use the expression, an altogether too unqualified respect. Thus Macewen, in his classic work, mentions slow pulse as an important diagnostic factor without making any reservation. Oppenheim, on the other hand, draws attention to the fact that there exist individuals whose pulse habitually has a rate of 60 or lower. Körner, in his work on otitic cerebral complications, mentions a case in which the pulse was 52, where the patient, a seventeen-year-old girl, in a somnolent state, but where all symptoms, including the slow pulse, disappeared after an ordinary mastoid operation. Uchermann states that a normal pulse rate of 56 may be found in men of calm, sluggish temperament.

There is every possible reason for bearing in mind, according to these views, that slow pulse is not uncommon in healthy individuals.

In the next place it must not be forgotten that a slow pulse may have its origin in diseases of quite a different category. I shall not attempt to enumerate the various possibilities, but shall merely mention as an example a case that was recently observed in the Ear and Throat Department of the Rikshospital: Total resection was performed on a nine-year-old girl for an uncomplicated chronic otitis on the right side. Two weeks after the operation she began to complain slightly of headache; she was taken with vomiting, and the pulse went down in the course of a few days from 70 or 80 to 60. She did not, however, give the impression of being very ill. And some days after the appearance of these symptoms icterus developed, accounting for the slow pulse and the other phenomena.

A further example to show how much caution is necessary is found in the history of the following case, which I shall deal with at some length, as it also contains other points of interest.

Rolf, H., twenty years old, admitted September 26, 1914;

discharged October 20, 1914. One month ago the left third molar in upper jaw was extracted for toothache. Afterwards he caught cold and a few days before admission he developed headache on the left side, fever, swelling and redness of eyelids. On admission there was also swelling down over the cheek. He looked ill, answered languidly, but was clear of mind. There were some chemosis conjunctivæ and slight protrusion of the eye (?), no tenderness over the forehead, but slight tenderness on pressure against the orbital roof inward. On ophthalmoscopic examination there were slightly distended veins. On anterior rhinoscopy, pus in middle meatus. The pulse on admission was 96, and temperature 37.6° C. On the following day, pulse 52. At the same time the patient was drowsy, clear minded, answered correctly but very languidly when questioned and complained of headache. There was extreme tenderness below the left inferior orbital edge, where the soft tissues were felt to be slightly infiltrated. There was slight tenderness of the floor of the left frontal sinus, but none in its anterior wall. On puncture of the left sinus maxillaris a quantity of pus was evacuated. Under morphin ether narcosis (Kuhn's intubation) Denker's operation was performed. In the sinus maxillaris, the mucous membrane on the medial wall was found swollen and grayish in color, and there was a small quantity of pus also in the ethmoidal cells. After the operation all the phenomena subsided in the course of five or six days. But the pulse remained slow, varying between 52 and 56, except that it was twice down to 48 and on a single occasion up to 72 (with a temperature of 36.8° C.). He was discharged fully cured. Reexamination on May 21, 1918: has had no trouble since leaving hospital; seems quite clear in mind; rhinoscopic examination gives no sign of inflammation of accessory sinuses; pulse, 56.

I will also mention here a case that Killian has reported (*Arch. f. Lar.*, Vol. XIII):

A twenty-three-year-old patient with double sinusitis frontalis had a pulse rate of 52, which later went down to 48. A radical operation was undertaken, after which the pulse rose to 60 in the course of one week; afterwards it was generally 72. Subsequently he was operated on for sinusitis maxillaris. During the plugging after this operation the pulse again sank

to 48. No intracranial complications were found and the patient was cured.

Killian regards it as "quite clear that with this patient the slow pulse arose owing to reflex action from the accessory sinuses." We ought, therefore, also to bear in mind such reflex action.

Considering the fact that the frequency of the pulse among healthy people may vary within fairly wide limits, it is exceedingly important to be able to follow the pulse of patients with sinusitis frontalis during a fairly long period of time. While the occurrence on a single occasion of a comparatively slow pulse is not a very reliable symptom, we are, on the other hand, entitled to attach considerable weight to decreasing pulse frequency, even if the slowness of the pulse, considered independently, is not very pronounced. This fact is illustrated by three of the cases reported above. I would specially draw attention to the fourth case where there existed an abscess of the frontal lobe without any other intracranial complications. In this case the pulse on the patient's first admission to the hospital was 92, and it remained between 72 and 80 during the whole of his first stay in the hospital. But when the patient was admitted for the second time the pulse frequency was 64—that is to say, it was about ten beats below his usual rate. This decrease in the pulse frequency was not very striking; but it was manifest. In deciding the question whether or not there existed a cerebral abscess considerable significance was therefore attached to it in conjunction with other symptoms, especially the violent headache.

I have allowed myself to dwell upon the significance of the relatively slow pulse because the symptoms of cerebral abscess are often obscure, and we must therefore take advantage of every means in order to arrive at a correct diagnosis. In order to ascertain a slight decrease in the frequency of the pulse it is, of course, necessary to have the patient under observation for some time and during that time note the pulse rate a couple of times every day. With patients suffering from sinusitis frontalis (and other affections of the accessory sinuses), where the symptoms are so serious that an important operation is demanded, one should therefore during the whole of the treatment note the pulse rate, even if there is

no suspicion of intracranial complications, for such a pulse record may be of value later on.

As already stated, the slow pulse is far from being a constant symptom. In cases of cerebral abscess the pulse may be either normal or rapid, and it may also be varying, as, for instance, in our first case, where towards the end it oscillated between 70 and 120. At that period, however, meningitis, no doubt, existed.

The condition of the pulse has also a certain bearing on the prognosis. After the operation one can generally, as in the four cases reported above, note an increase in the pulse frequency. The only one of our patients that was cured had during the whole time after the operation a pulse rate of from 70 to 80, and neither did he during that time show any other serious symptoms. In the case of the other three patients, on the other hand, the rise in the pulse rate after the operation was only temporary, but under circumstances entirely different in the different cases; concerning this point I refer to the history of the cases.

It is, of course, impossible on the basis of these few cases to draw definite general conclusions. But the facts observed are nevertheless worth noting. Moreover, it may be added that, even if the pulse remains slow for some time after the operation, the patient may nevertheless recover, as in Rische's case, where during the five days immediately following the operation the pulse was down to 48, and to Herzfeld's case, where it remained slow (48 to 58) for one week after the operation.

Regarding otitic cerebral abscesses, Körner says that disturbances in the sensorium are never absent during the manifest stage. The same assertion may probably also be made regarding the abscesses we are treating of here—at any rate, if the size of the abscess is not altogether too insignificant. Thus in the case of our four patients, the sensorium was more or less altered. As regards the two first patients distinct drowsiness was present. The third patient was inert and gave an impression of peevishness (not noted in the record). Finally, the fourth patient was peevish and "cross" during his first stay in the hospital. That this was a symptom of his malady was clearly shown after the abscess had been opened. He

then proved to be of an amiable and cheerful disposition. In the cases reported by medical authors we likewise find constant reference to changes in the sensorium and in the psychic state, for example, weakening of the memory and irritability (Wiener); inclination to sleep (Denker); stupor, apathy (Freudenthal); apparent stupidity (Rische); the patient answers slowly but correctly (Donalies); peculiar alteration in character (Reinking).

The symptoms mentioned may be assumed to be general cerebral symptoms. The supposition that the psychic functions are connected with the left frontal lobe and that from the absence or presence of psychic symptoms we should be able to draw conclusions regarding the seat of the disease (Gerber) is unfortunately without solid foundation. Neither does it appear from the literature that it has been possible for the authors to make use of such a diagnostic criterion.

On the contrary, it is unfortunate that with abscesses of the frontal lobe focal symptoms are generally lacking. I will here mention that among our four patients the first developed paresis in the contralateral arm and in the facial nerve (?), symptoms which are of importance when in the case of a patient with double sinusitis one has to decide on which side the cerebral complication is situated. In the case of our third patient there appeared immediately before death a paralysis of the arm and leg on the opposite side of the abscess. Local paralysis is, however, of not seldom occurrence with such patients.

Neither is the occurrence of convulsions anything unusual, either general, as with our second patient, who had two epileptiform attacks, or localized, as with our first patient, who had convulsive twitchings in the left arm. As a rule, as in the case of this patient, the localized convulsions appear on the side opposite to the abscess. Nevertheless, Donalies has observed convulsions on the same side, which at first led to an erroneous focal diagnosis, the sinusitis being on both sides. The abscess, however, was afterwards located and the patient cured. Convulsions have also been described by a number of authors, for instance, Grünwald, Wiener, Pauntz, Freudenthal and Rafin.

Vomiting is a symptom that was present in all our four

cases and in some of them a very conspicuous symptom. In each of the cases this symptom appeared at a comparatively early stage. In the first three patients it was noted before admission, and with the fourth patient vomiting occurred on one occasion during his first stay in the hospital, when as yet no symptoms had developed that might lead us to suspect the existence of a cerebral abscess. Vomiting is, to be sure, a very common symptom in many maladies, and a single attack of vomiting must not, of course, be at once interpreted as a sign of cerebral abscess. On the other hand, we must not underestimate the importance of this symptom for the diagnosis. We must have our eyes open to the possibility of the existence of such an abscess when with patients suffering from frontal sinusitis there occurs vomiting for which no other satisfactory explanation can be found, and especially, of course, when the vomiting occurs independently of meals.

Dizziness is less frequently mentioned in medical literature than vomiting. Thus in the case of our four patients it only occurred with the first and fourth. In the case of the latter the dizziness was so much in evidence that he could not stand on his legs.

Of other symptoms which are mentioned in the case history, but which are of less importance, I shall name: stiffness in back of neck, incontinence, changes in sensibility and reflexes, decided loss of flesh, attacks of shivering. All of these are rare, and moreover they are not distinctive features.

The state of the temperature offers nothing characteristic, as is also clear from the history of our four cases. It may be normal or subnormal, there may be a trifling rise, or there may be fever. The significance of a rise in temperature in each separate case may be difficult to determine. It may be due to the sinusitis, to an ocular complication, or to some other intracranial complication (meningitis, sinus phlebitis). As a rule, it is not possible to draw diagnostic conclusions. This much, however, may be asserted, namely, that considerable rise of temperature does not necessarily form part of the clinical picture in cases of cerebral abscess.

Neuritis optica and stasis of the papilla have been described in a number of cases. The presence of these symptoms points in a positive direction when there is a question of an intra-

cranial complication in connection with frontal sinusitis. Apart from the first case there is, unfortunately, nothing noted on this point in the history of our cases.

On the other hand, I may draw attention to other symptoms or complications proceeding from the eye. Swelling from the eyelids was found in all our four patients. Sometimes it was very extensive, as with patient No. 4, who had an abscess of the eyelid which had to be lanced. Swelling of the conjunctiva was recorded in the cases of patients Nos. 2 and 4, the chemosis being very pronounced in the last named case. With the same patients there was a considerable protrusion of the bulbus. In the case of No. 3 the operation revealed an orbital abscess. Finally, as regards No. 2, the history of the case prior to admission shows that a flow of tears from the eye was the first symptom the patient noticed. Similar discoveries are frequently recorded in the history of cases of frontal lobe abscess; for example, orbital phlegmon (Cargille), abscess of the eyelid (Pauntz, Rische, Rafin), edema of the eyelid (Freudenthal), exophthalmus (Heimann).

Now, of course, these external ocular symptoms in themselves prove nothing as to whether or not there exists an affection of the contents of the cranium. Strictly speaking, they only signify that the inflammation in the frontal sinus threatens to extend, or has already extended, to the orbit and the contents thereof. But the oculoorbital complications are known to appear comparatively often in those cases of sinusitis which are accompanied by intracranial complications. And thereby they acquire a certain diagnostic value. While the frequency of ocular complications (de Lapersonne cit. from Hoffmann) in connection with frontal sinusitis may be estimated at 20 per cent (no extensive figures exist), it has been proved that these complications arise far more frequently in connection with abscesses of the frontal lobe issuing from the frontal sinus. Thus in Gerber's collection they constitute 50 per cent of sixty-four cases.

It will not be out of place to call to mind here Boenninghaus' assertion that hardly a single case of intracranial complication issuing from the nasal accessory sinuses (excluding the sinus sphenoidalis) has been described without mention being made of swelling in the facial or orbital wall of the acces-

sory sinus, while the opposite is the case with complications arising from inflammations in the ear, especially those which are chronic.

The presence of oculoorbital and other external symptoms of inflammation must be interpreted as an expression of the tendency of sinusitis to extend to the surrounding parts, whatever may be the cause of this more malignant development (the nature of the infecting matter, the organism's slight resisting power or the imperfect outlet for the secretion in the frontal sinus). It is quite natural that this malignant tendency of sinusitis should also manifest itself in the extension of the inflammation through the cerebral wall of the frontal sinus and thus result in abscess of the frontal lobe and other intracranial complications. In the presence of acute external symptoms we must therefore especially be on our guard for the possibility of cerebral complications.

The condition of the wall of the frontal sinus and of the dura mater can, of course, only be determined with certainty in the course of the operation itself; macroscopic changes in these parts may sometimes have a certain amount of significance for the diagnosis.

It seems to be a fact that the posterior wall of the frontal sinus is affected in most cases. Among forty-nine cases in which Gerber found this point mentioned, affection of the posterior wall was stated to exist in forty-four. Generally it was a necrosis (forty-four cases). Among our four cases No. 3 showed a narrow opening in the posterior wall. In the case of No. 1 and No. 2 there were changes, but not to any pronounced degree ("the bone was denuded," and "the bone thickened, a little decayed"). In the case of our fourth patient there were no changes at all to be observed.

Changes in the dura are met with in most cases (Killian). The dura is found to be covered by granulations and tense (Denker), pale and tense (Pauntz), of bad appearance, dirty gray (Gerber), covered with granulations (Rische), tense and protruding (Rafin), yellowish gray, discolored (Donalies), decayed and discolored (Herzfeld), ulcerated and perforated (Orlandini, cit. from Gerber). Frequently it is recorded that the dura is pulseless, a symptom to which, however, there seems to be very little importance attached. With regard to

what was observed in the case of our own patients, the dura in the first case was "dirty gray, yellowish"; with our second patient, "thickened, not pulsating"; with No. 3, "thickened, somewhat yellowish, in some places covered with granulations." Finally, in the case of the last patient, the surface showed no distinct changes; the dura was pulsating and seemed to be tense and bulging a little.

The importance of the condition in which we find the posterior wall of the frontal sinus and the dura may be described as follows: When we find morbid changes in these parts, this fact strengthens the assumption that a cerebral abscess exists. If no changes can be proved to exist, it is often best to make a halt at the dura and to watch the development of the situation for a day or two before going further in. But if the symptoms point strongly in the direction of an abscess, we must not allow ourselves to be deterred, but must take measures at once, even if the changes in the dura are of a very uncertain nature, just as in our fourth case, where a postponement of the opening of the cerebral abscess would probably not have been without danger to the patient.

TREATMENT.

If we have now duly ascertained the presence of a cerebral abscess, the battle is not yet won. The therapeutic difficulties are by no means small. This is proved by the lack of agreement that has prevailed and still prevails on various questions concerning treatment, and perhaps to a still greater degree the after-treatment. The views which are maintained concern, generally speaking, both rhinogenic and otogenic cerebral abscesses. What can be asserted regarding the one class of abscesses can, on the whole, be equally well asserted about the other class, even though the circumstances are not quite alike for the localization in the different cases.

That a cerebral abscess must be opened is generally agreed. But as to how this should be done, how large the opening ought to be, how we shall deal with the abscess cavity during the operation and how the after-treatment is to be conducted—on all these important points there is a wide difference of opinion. And on all these questions we can cite good names in support of absolutely opposing views.

The first question that arises is: where shall we look for the abscess that has been diagnosed? In this respect we are more or less happily situated. Körner, as is well known, has, in the case of otogenic cerebral abscesses, laid down the principle that abscess, practically speaking, always lies in the neighborhood of the primary suppurative process in the temporal bone. This law can be extended to abscesses arising from the frontal sinus. We can with fairly great certainty count upon the cerebral abscess not being far distant from the cerebral wall of the frontal sinus. It is therefore directly behind this latter that we must look for the abscess. And we may count upon hitting on the right spot, even if the changes in the dura do not clearly point out the way, which they, moreover, frequently do.

In what manner shall we now make the entry into the assumed abscess? It is here that the difficulties and disagreements begin.

Shall we make a trial puncture through the dura or shall we first make a slit? And what instrument shall we use for puncturing? Many authorities warn us against puncture. Others prefer that method of procedure, especially Heine, who after he adopted the use of a thick needle has never found that method to fail; neither has he experienced any disadvantage in the employment of such a means of puncture. On the other hand, the same author has had the experience that incision with a knife proved unreliable in one case, where pus has been found on previously making a puncture. Körner in his book on otitic cerebral complications warns us against puncture. After such a puncture he noticed profuse intrameningeal hemorrhage from the vessels of the pia mater. He therefore says that the dura must first be slit. Nevertheless, Körner himself, in the case of frontal lobe abscess, performed a puncture through the dura with a Pravaz syringe, immediately found pus, evacuated the abscess and cured the patient. (*Centralbl. f. Ohrenh.*, LXIII, 232.) Rafin also made a puncture with a Pravaz syringe in his case (the first recorded cure of abscess of the frontal lobe), without, indeed, finding pus but also without harmful results. Paunz proceeded in the same manner and on the second insertion found pus in the syringe.

Those who condemn the method of making a puncture through the dura emphasize, in addition to the danger of hemorrhage, the possibility that the puncturing needle may convey infective matter from the meninges into the brain tissue and thus occasion infection of the latter. Both Körner and Zaufal record that they have had this experience, likewise Brieger (cit. from Guttman). Uchermann, also, for the reasons mentioned above, warns us against puncturing through the dura. He first makes a little opening with a sharp pointed knife in the dura, and lifts the latter up with a sharp hook to avoid lesion of vessels of the pia mater. Thereupon he extends the opening and finally makes a small incision at right angles to it in order to get a better view of the meninges and to be able to introduce the puncturing instrument without using force. For making the exploration he employs a slender Pean's forceps, which is inserted to a suitable depth while closed, and then cautiously opened and drawn out.

One must admit with Heine that a previous slitting of the dura involves a more extensive interference, and that also in this way the infective matter may be conveyed farther in. It has also been urged against slitting the dura that one thereby runs the risk of a prolapsus (Koch, cit. from Gurrmann).

In addition to the needle, knife and Pean's forceps there have also been employed as exploring instruments the trocar and an instrument called a "searcher," specially constructed for this purpose by Macewen, although it cannot be seen from the literature that these latter offer any special advantages.

If from what has been set forth we shall now try to adopt a definite standpoint in the question here dealt with, it must be admitted that it is not very easy to do so.

The ideal method would be one which enabled us to determine with certainty whether or not there existed an abscess and at the same time exposed the patient to no risk whatever. Such a method does not exist. One must therefore try to adopt the method of procedure that comes as near as possible to the ideal requirements.

Personally I am of the opinion that one must not feel oneself absolutely bound to any single method. As to abscesses of the frontal lobe, I have arrived at the following conclusion: These abscesses, by the time we are in a position to diagnose

them with any approach to certainty, have as a rule attained pretty large dimensions. Thus all the three abscesses I have observed were large. And on perusing the history of cases in the literature it will be seen that the abscesses operated in other quarters have practically always been of respectable dimensions. These large abscesses, I believe, cannot easily escape discovery on puncture if one uses a fairly thick needle (1 to 2 mm.). On the other hand, if an abscess does not exist, I am of the opinion that this small operation involves less risk to the patient than slitting the dura with subsequent explorative puncture of the brain, whether that is performed with needle, knife or forceps. In order to diminish the risk of hemorrhage one can, following Reinking's suggestion, employ a needle that is not too sharp and which therefore can more easily glide past any vessel that might come in the way. The danger of infection seems to me to be equally great with slitting the dura, since it leaves a wound which is afterwards constantly in contact with an infected area; in my judgment the chance of a secondary infection from the frontal sinus to the contents of the cranium is increased rather than lessened.

Therefore, when the dura is little changed or not at all abnormal, I would choose puncture with a thick needle, without slitting, making the puncture at a spot where the dura appears to be healthy.

If, on the contrary, marked changes are found in the dura, especially a fistula or great discoloration, an immediate slitting of the dura should no doubt be considered, after the diseased area has been exposed to a sufficient extent. In such cases it may be assumed that the risk of an instrumental infection of the deeper seated parts is especially great. If in this case we make a slit in the dura and keep the edges apart, we then get a view of the extent of the inflammation in the meninges and can better judge how we must proceed and how far. In these cases the mode of procedure mentioned by Neumann (cit. from Reinking) will probably be often suitable. He makes a crucial incision in the dura, and waits till the cerebrum presses out into the opening and then punctures the brain. If the cerebrum does not press forward, that fact speaks strongly

against the supposition that an abscess exists. In such a case one must adopt a waiting attitude.

How far is it permissible to insert the puncturing instrument? Denker has measured the distance in adults between the anterior pole of the frontal lobe and the anterior horn of the lateral ventricle in a horizontal plane about 2.5 cm. above the floor of the anterior cerebral pit. The distance varies from 2.7 to 3.9 cm.; on an average, 3.3 cm. He therefore asserts that one can penetrate to a depth of 2.5 cm. without risk. If we are moving in a plane that lies only from 1 to 2 cm. above the floor of the cranium, we may go to a depth of 4 or 5 cm.

Now that the abscess has been found it must be evacuated. How? Most authorities seem to have adopted a comparatively long incision in the dura. Some of them lay special emphasis on this. Many employ a crucial incision (Macewen, Gerber, Körner, Boeninghaus, Uchermann, Imhofer, Passow). Others regard a smaller incision as better (Dean, Buller, Denker), especially with regard to the danger of prolapsus. Miodowski (Brieger's clinic) asserts that one must work cautiously in order not to loosen existing adhesions.

The opening of the cerebral abscess itself can be performed with a knife, but a Pean's forceps is especially in favor, and we often see in the history of cases that it was only by the insertion of this instrument that the pus could be caused to run out, incision with the knife having failed.

Palpation of the abscess cavity with the finger is practiced by some, but nobody seems to me to have given any satisfactory explanation as to what is attained by that exploration. Others expressly warn us against this manipulation, which is, of course, not free from danger.

For cleansing the abscess cavity the methods employed are: wiping out, careful scraping with a sharp spoon and lavage. Thus Macewen washes out the cavity by means of two canulæ, of which one is twice the caliber of the other, permitting the cleansing liquid (1 per cent carbolic solution) to go in through the small and come out through the large canula.

Still some authors reject every form of wiping or washing out of the abscess cavity (Alexander), and the same is true about rinsing (Botey, Whiting and others).

In order to inspect the abscess cavity various instruments have been employed. Körner says that he has found Kilian's long nasal speculum convenient. Whiting has constructed an "encephaloscope" of his own, which is shaped almost like a large aural speculum and provided with a conductor, which is removed after the instrument has been introduced. Whiting claims that the encephaloscope has reduced the rate of mortality in his practice. A similar instrument has also been constructed by Uchermann; it has been used in the Ear and Throat Department of the Rikshospital (no published record), but it was not found serviceable and was therefore abandoned. Finally, I shall mention that Henke has employed the bronchoscope, which is introduced without mandrin and thus can always be under the control of the eye.

By means of these different instruments the authorities now think that they can control the abscess cavity, find out if the walls of the cavity have adhered together and separate them, thus preventing retention of pus in recesses and the formation of secondary abscesses.

And now we arrive at the important subject of the after-treatment of the abscesses. The operation has to perform the first task in the process of treatment, namely, the opening and evacuation of the abscess. Not less important is the second task, which rests with the after-treatment, namely, to provide a sufficient outlet for the secretion.

The main question in connection with the after-treatment, the pivot upon which the discussion revolves with practically all the authorities, is this: Drainage tube or tamponade?

The choice between these two is difficult. This is shown not only by the fact that both methods have their adherents among eminent and experienced authorities, but is also proved by the circumstance that several operators have begun with the one method and afterwards gone over to the other. Nay, we actually meet with records in which we find the after-treatment in the same case begun in the one way and continued in the other.

Among the adherents of the drainage tube method we find Macewen, Körner, Uchermann, Heine, Freudenthal, Henke, Rafin, Schmiegelow. Tamponade has been adopted by Denker, Passow, Eulenstein, Whiting, Herzfeld, Neumann,

Müller (Trautmann's clinic), Miodowski (Brieger's clinic), Reinking, Alexander.

It may, however, here be added that Macewen, for example, only conditionally recommends the drainage tube for acute abscesses. In case of a foul abscess cavity he uses iodoform gauze, changes every day and washes out the cavity. If, on the contrary, the abscess cavity is "aseptic," he employs an absorbable drain (decalcified chicken bone), the inner end of which just reaches inside the outer wall of the abscess and is sutured to the skin. This tube is left for two or three weeks. Heine inserts the drainage tube nearly as far as the inner wall of the cavity. He emphasizes that the drainage is imperfect, whether we use drainage tube or tamponade. When the secretion has become insignificant he substitutes a strip of iodoform gauze for the drainage tube.

Ropke employs a tamponade if the cavity appears clean, drainage when the secretion is more profuse. In this latter case he changes the dressings up to two or three times daily.

Among those whom bitter experience has converted from the one method to the other I shall mention the following:

Boenninghaus employed at first the drainage tube, but afterwards went over to the use of tamponade. He states, however, in his article on intracranial complications in connection with disease of the accessory sinuses (1914) that the question is undecided. Buller (Scheibe's clinic) has had unfavorable experiences with the tamponade and employs the drainage tube when the secretion is profuse. He points out, however, that the danger in the use of the latter is by no means slight.

Finally, I shall adduce one or two examples of cases in which the after-treatment has wavered between both methods. In Paunz's case (rhinogenic frontal lobe abscess) loose plugging was first adopted; two days later this was changed to the use of a drainage tube; eight days after he again reverted to tamponade. Imhofer (two otogenic temporal lobe abscesses) employed in one case: drainage, collargol, tampon, drainage (owing to retention behind the tampon), tamponade (the drainage tube was blocked by a coagulation). In the other case: drainage, gauze strip dipped in liquid paraffin, drainage, gauze strip with paraffin. He asserts that both the

drainage tube and the tampon are defective in that they fail to act on account of the secretion's "Eindickung." In order to counteract this he recommends (following Oettingen) a compress with physiologic salt solution; however, the first dressings ought to be dry in view of the possibility of hemorrhage.

Thus there seems to be a good reason to assert with Boeninghaus that the question of drainage tube or tamponade is still undecided.

It would be a tempting task to endeavor to throw light on this question by comparing the results attained by the different methods. Unfortunately, such a comparison would bring us no nearer to the solution of the problem. In the first place, a perusal of the more complete statistical tables concerning cerebral abscesses (for instance, Ropke's) shows us that the cases cured do not predominantly belong to a special method of after-treatment. In the next place, the results are also dependent on a number of other factors in the treatment, of which it is impossible to judge on the basis of the cases recorded. Finally, the abscesses, even in uncomplicated cases, undoubtedly have a prognosis which from the very beginning is different in the different cases, being dependent on the size, shape and situation of the abscess, on the nature of the infecting matter and on the constitution of the surrounding cerebral tissue.

There are still a number of questions regarding after-treatment which I shall very briefly consider.

How frequently should the dressings be changed? Macewen here adopted a standpoint that is absolutely startling. In some cases, as mentioned above, he allows the first dressings to remain for two or three weeks. He is able to record a case in which the dressings lay for three weeks and in which on their removal the wound was found to be completely healed. In the twenty-five years that have elapsed since that case was recorded no one has been able to report results that even approximately come up to the one mentioned. Most operators allow the first dressings to remain for two or three days and afterwards let the frequency of changing be regulated by the amount of secretion or by any symptoms of retention that may appear. If there is much secretion some change the

dressings as often as two or three times daily (Ropke, Imhofer). Also, Neumann emphasizes the importance of frequent changing. Speaking of a difficult case with profuse discharge, a large, tortuous abscess cavity and fetid pus, he says that the only expedient that availed in the end was to change the dressings twice every day. Finally, I may mention that Boenninghaus lays down the principle that the dressings should be changed every day, even if there is no pain, fever or other phenomena present.

The patient ought to be kept in bed for a long time after the operation; Macewen keeps the patient in bed for four or six weeks, even if he feels perfectly well, and under no circumstances will he let him get up before the wound has been completely healed. He mentions a case of death, which he ascribed to cerebral edema brought on by the patient's getting up too soon. Our fourth patient remained in bed for nearly three months, but after getting up there were slight increases in the evening temperature, whereupon he was again kept in bed for some weeks more. As no other reason for the rise in temperature could be proved to exist, we may reasonably assume that there still existed some changes in the vicinity of the abscess which had not yet been completely eliminated and which announced themselves on the alteration in the patient's mode of life. There is, at any rate, every possible reason for using the greatest caution about letting the patient get up.

Cerebral prolapsus has been mentioned previously. This complication is of fairly frequent occurrence. It may cause difficulty in the after-treatment of the abscess and also represents in itself a certain danger. Attempts have therefore been made to prevent its occurrence. Thus some authors for this reason recommend that the incision in the dura should not be made too large (v. Bergmann, Bezold, Dean, Denker). Efforts have also been made to get the prolapsus to disappear after it has been formed, by means of cautious compression and lumbar puncture, but it seems clear from the experience of the authors that the results have been rather doubtful. If the prolapsus interferes with the escape of the discharge it can be cut away (Heine), although this may give rise to unpleasant results, such as opening of the lateral ventricle and hemorrhage (Reinking). The simplest and least irritating

treatment consists simply in the employment of ordinary sterilized dressings (Reinking). It must be remembered that when the increased intracranial pressure ceases with the cure of the abscess or encephalitis, the prolapsus will then also as a rule disappear. An active treatment of the prolapsus will, therefore, generally speaking, scarcely be profitable.

Before proceeding, in conclusion, to set forth the principles which in my opinion should be observed in the treatment of abscesses of the frontal lobe, I want to mention in a few words the data we possess regarding spontaneous cure of cerebral abscesses.

That a cerebral abscess may be cured by absorption is mentioned in the literature as a theoretical possibility, but no concrete example of such a cure has been anywhere recorded.

Otherwise is the situation with regard to the question of cure by spontaneous bursting and evacuation of the abscess. In this connection I shall first mention what Körner points out, namely, that it is often possible anatomically to establish the existence of a communication between an otogenic cerebral abscess and the tympanic or mastoid cavity. It may therefore be assumed that in many cases there is an imperceptible discharge from the abscess through the ear. Spontaneous evacuation of an abscess by this channel has also been observed (Randall, Gribbon), but without resulting cure.

There have been observed, however, cases of real spontaneous cure, which seem to stand criticism and which have also been acknowledged by various authors.

Sutphen observed a patient who suffered from extensive caries in the temporal bone, and who presented symptoms of cerebral abscess (headache, vertigo, nausea, hemiplegia on the opposite side). These symptoms disappeared after considerable quantities of pus had spontaneously discharged themselves through the ear. Four months afterwards the patient died of carotid hemorrhage. On dissection there was found in communication with the carious cavity in the temporal bone a cerebellar abscess, and in front of this a cicatrized mass extending upward, which could have been nothing else than a healed abscess. Pollak, in the case of a thirteen-year-old boy, on whom he had performed total resection of the middle ear and in whom he diagnosed a cerebral abscess, next

day found that this abscess had burst spontaneously through the dura. The abscess cavity was washed out and drained. The patient recovered. Urbantschitsch has reported a similar case. On a woman he performed the operation of total resection; during this the dura was laid bare, but showed no pathologic changes. After the operation there was increasing headache. On changing dressings about nine days after the operation there burst out "close upon a quarter of a liter" of fetid pus. This proved to have come from an opening in the dura, through which a probe could be inserted several centimeters into the brain. The patient recovered.

Brieger records (in a letter to Ropke) a case where the dura was exposed, but the operation was suspended owing to the dangerous condition of the patient. The next day the cerebral abscess had burst through the dura spontaneously. The abscess cavity could be conveniently plugged through the natural opening. A cure resulted.

The total number of natural cures recorded is small. They merely prove that we must admit the possibility of a spontaneous cure. They cannot, however, veil the fact that the prognosis for a cerebral abscess without surgical treatment is practically always bad. But from a pathologic-anatomic point of view they are of the greatest interest, and they show us how great are the healing powers that nature possesses—the same powers that in other parts of the body in numerous cases bring about a spontaneous cure of an abscess. I would here point to the everyday experience we meet with of a peritonsillar abscess bursting and healing up of its own accord. The same is the case with glandular abscesses in the various regions, etc. I might also mention empyema e necessitate, and peritoneal abscesses of various origin which burst into the intestine, into the urogenital tract, in rare cases even through the abdominal wall.

Finally, to come back to cerebral abscesses, I would point to nature's faculty of limiting the inflammation by the formation of adhesions in the meninges and in the membrane around the abscess. For therapeutic purposes attempts have been made to encourage the formation of the meningeal adhesions. Thus Miodowski has proved by experiments on dogs that by introducing tampons with tincture of iodine between the bone and

the dura, adhesions may be produced in the subdural and arachnoid spaces. He has also on a single occasion employed this method of procedure on a human subject, but there is no record of the result.

I have mentioned the few cases of spontaneous cure of cerebral abscess and the many evidences of what I should like to call nature's will to cure, because I think that they should be remembered and taken into account in the treatment of cerebral abscesses.

In conclusion, on the basis of medical literature and of our four recorded cases, especially the three last, I shall endeavor to sketch the lines on which in my judgment the treatment and after-treatment ought to be conducted. While in the preceding pages I have spoken chiefly of cerebral abscesses in general (excluding traumatic abscesses, in which the conditions are different), in what follows I shall have specially in view the rhinogenic abscesses of the frontal lobe.

The question of explorative puncture after exposure of the dura I have treated at some length above and would refer the reader to what has been said there.

The Evacuation of the Abscess.—When there is a fistula in the dura I would evacuate the abscess by cautiously enlarging the fistula and extending the opening with a Pean's forceps. Should the dura be sound, I would make an incision of moderate dimensions, 1 to 1.5 centimeters. This opening I would cause to gape apart by means of a Pean, inserted so far that the point just reached the level of the outer wall of the abscess. When the pus issues through the opening it ought not all to be allowed to run out in a continuous stream; the evacuation should take place at intervals. In this way, in the first place, the change in the intracranial pressure occurs less suddenly. In the next place, it seems to me in some degree probable that by this means we get the walls of the abscess to draw together more concentrically than with a sudden evacuation of the pus. If this is right, the risk of the formation of recesses and pockets is thereby lessened, which is of importance, because they can give rise to the formation of secondary abscesses with disastrous results.

My reason for making the opening in the dura comparatively small is that I would try to keep the incision within the area

in which there are to be found adhesions between the meninges themselves and between them and the surface of the brain. Thereby we may hope to limit the possibility of the inflammation spreading further in the cerebral meninges. I also regard a small incision as desirable, with a view to the possibility of a prolapsus. We cannot, of course, quite eliminate such a possibility by making the opening small. When the contents of the cranium increase in size in consequence of inflammatory changes they will force themselves out through any opening, even if it is not large. But with a small incision in the dura we can under favorable circumstances insure that the cerebral matter pushes the membranes before it—that, in other words, we get a sort of meningoencephalocele instead of an encephalocele. This was the case with our fourth patient. The protrusion in the area of the wound which arose during the after-treatment evidently consisted of cerebral matter covered with the meninges. It could be observed that there was no protrusion through the incision itself, which lay at the apex of the protruding portion. The protrusion subsided of its own accord in the course of a couple of months. It may therefore be assumed that during that time the contents of the cranium were increased in volume owing to inflammatory changes. It must be counted as an advantage that the protruding contents of the cranium were during the period mentioned protected by the dura mater, as the danger of infection with this form of prolapsus may be supposed to be less than with the ordinary form.

For fear of injuring the wall of the abscess and thereby causing an extension of the inflammation I would not undertake any wiping or scraping out of the abscess cavity, nor any palpation with the finger. Much less would I attempt to remove the membrane of the abscess. The latter ought to be regarded as a natural safeguard which should be left untouched. Neither would I venture upon any syringing of the cavity, although it seems that such a measure, if cautiously executed, may in many cases be undertaken without causing damage.

As a rule I would employ neither drainage tube nor tamponade of the abscess cavity in the usual manner. In the opening in the dura I would insert either a drainage tube or a strip

of gauze (the choice between which I regard as of little importance) only so far that they reach the entrance to the abscess cavity itself. All that can be obtained without risking injury of the cerebral tissue surrounding the abscess is scarcely more than the prevention of the edges of the opening from sticking together. The object of keeping the incision open can, perhaps, be best attained by employing a rubber drainage tube in the first place. Afterwards I believe it is equally serviceable to use a strip of gauze, because this material is soft and therefore cannot occasion any mechanical lesion. Besides, the drainage tube slips out more easily, even if it has been sutured to the skin. Imhofer's suggestion of the use of paraffin gauze seems to me to be worth a trial.

In order to secure the best possible chance for a free outflow of the pus the dressings ought to be changed with sufficient frequency. Even the first dressings ought not to remain longer than twenty-four hours; and I would not hesitate to change them two or three times a day if there is profuse secretion and if on changing it is seen that considerable quantities of pus stream out through the incision in the dura. This opening should every time be made to gape apart by means of a Pean forceps, which, however, ought not to be inserted too far.

As regards the nature of the dressings, I would employ the dry form. Should the secretion show an inclination to dry up, so that the dressing sticks to the wound, it may perhaps be advisable to substitute compresses with physiologic salt solution. We can, however, under these circumstances employ hydrogen peroxid for loosening the dressings. The tendency of the dressing to stick to the wound can also be counteracted by dusting a powder (boric acid, vioform) on the wound.

The question of a protracted confinement to bed has been dealt with above. The treatment of possible coughs or obstruction and other ordinary measures need not be discussed in detail.

If under the extremely conservative treatment above described there should arise symptoms pointing to retention, or secondary abscess, we shall then be obliged to make an attempt to go deeper in for the purpose of finding and evacuating the

new pus focus. Under such circumstances I would try Henke's suggestion of the bronchoscope, as that instrument has the advantage over the others proposed that we are always able to control with the eye the depth of its insertion.

Thus I arrive at the conclusion that, in general, abscesses of the frontal lobe ought to be treated in a very conservative manner, as suggested in the therapeutic scheme sketched above. In this way I believe that the patient can be saved in those cases in which the abscess from the beginning has a comparatively good prognosis. It is precisely in such cases that one ought to proceed cautiously. It must be remembered that when a cerebral abscess has been evacuated the walls of the cavity fall together very quickly and that the surrounding substance is very soft. The pulpy mass which is met with directly inside the incision is undoubtedly very sensitive to the introduction of foreign bodies (instruments, drainage tubes, tampon). In these comparatively benignant cases a too vigorous therapeutic treatment may spoil the prospects of a favorable issue. On the other hand, in those cases where the abscess tends to take a more malignant course we cannot in any case expect the result which is often attained in other parts of the body through vigorous surgical treatment. The material of the brain is much too delicate for that. We must accept the fact that cerebral abscess is a dangerous malady, which even after being opened, has a doubtful prognosis. Of the eighty-seven recorded cases of frontal lobe abscess arising from the frontal sinus (Boenninghaus) only fifteen were cured.

It may perhaps with justice be objected that I have in an altogether too one sided manner upheld the importance of a conservative treatment for these abscesses. Possibly, too, the reader will feel that I have been carried away by my gratification at the favorable result in the case in which the conservative principle was on trial, and that I therefore have been too ready to draw general conclusions from the result in a single case. Yet I hope it will be admitted that the views advanced find some support, not only in the experiences of others as reflected in medical literature, but also in general medical reasoning, although, undoubtedly, there is need for further experience in the matter. What I have tried, above all, to

emphasize as being important in the treatment is a principle that must always be held sacred by us, namely, "non nocere."

OTHER INTRACRANIAL COMPLICATIONS IN CONNECTION WITH
INFLAMMATION IN THE ACCESSORY SINUSES.

The following account of cases treated is only to be regarded as a small contribution to our knowledge regarding the other intracranial complications in connection with inflammation in the nasal accessory sinuses.

In his book on these forms of inflammation Hajek in 1903 asserts that cavernous thrombosis is the classic form of intracranial complication for inflammation in the ethmoidal labyrinth. This classification, however, does not coincide with the actual facts, as later experience has proved. Hajek has therefore in the edition for 1909 omitted the passage mentioned. The more comprehensive collection of cases (cf. Boenninghaus) which has by degrees been compiled proves that we may expect any kind of intracranial complication whatsoever in connection with different complications; moreover, they frequently occur in combination with each other. It is therefore scarcely feasible to make these cases fit into a definite classification. Most complicated are those cases in which there is combined inflammation of the accessory sinuses. It is not easy to determine in each separate case which of the accessory sinuses forms the starting point for the combined pathologic changes. Thus in one of the cases recorded below (Erling, B.), we find on the one side a number of affections of the accessory sinus and on the other side several intracranial complications.

INTRACRANIAL COMPLICATIONS FROM DISEASE OF THE SINUS
MAXILLARIS.

In proportion to the great frequency with which sinusitis maxillaris occurs, the intracranial complications in connection with this malady may be said to be extremely rare. Hajek, who demands very strong proofs before admitting a direct etiologic connection between the sinusitis and the cerebral complication, regards only two of the cases recorded up to the year 1909 as being absolutely free from doubt. But even if with Boenninghaus and Dreyfuss we go a little farther than

this, the number is still very small. Boenninghaus reckons that of the cases recorded up to the year 1914 nine belong to this group, namely, seven cerebral abscesses (combined with pachymeningitis, leptomeningitis or thrombosis), one meningitis and one thrombosis in the plexus ven. carotic.

Regarding the mode of infection, Boenninghaus states that it is a matter of septic osteomyelitis and periostitis in the upper jaw bone, generally of dental origin (the so-called Weichselbaum's phlegmon), which ascends from the upper jaw and infects the os frontis, the os ethmoidale, the os zygomaticum and finally the cavum cranii or the contents of the orbita, and in most cases results in death from meningitis after the formation of a cerebral abscess.

Paunz also maintains that empyema in the maxillary sinus of dental origin is more malignant than that originating from the nose. He has observed four cases of dental sinusitis with serious complications, one of which had a fatal issue (cerebral abscess and meningitis).

Likewise the two following cases seem to confirm the view that sinusitis arising from the teeth is relatively malignant:

Case 5.—Johanne, B., eleven years old, admitted August 12, 1906; died August 20, 1906. The patient had toothache on August 5th. A dentist extracted the first molar in the upper jaw on the left side. After coming from the dentist swelling appeared in the left cheek. She became feverish, and on the next day the pus was discharged from the left nostril. On August 7th she visited a doctor, who immediately had her put into the Eye Department of the Rikshospital, where the following facts were observed: Both eyelids on the left side were swollen, especially the upper one, which was red, and covered the upper part of the lower lid. The left bulb was displaced outwards and also a little downwards; there was some tenderness in the eyelids. Conjunctiva greatly congested, but not chemotic. Cornea and anterior chamber, etc., showed nothing abnormal. The mobility of the eye is somewhat restricted in all directions. No neuritis or stasis of the papilla. Patient says she can see just as well as before. In the lower portion of the forehead, over the bridge of the nose and over the left eye, there was a very slight prominence, in which fluctuation was felt, but the integument was pale and not edematous.

In the left half of the nose the lateral wall was seen to be much swollen. Temperature, 38.2. General condition quite good, no pain. Mind perfectly clear. On August 8th some swelling also appeared in the eyelids on the right side.

Operation under chloroform ether narcosis. Puncture of the left maxillary sinus from the lower nasal passage was followed by a discharge of fetid pus. Afterwards a perforation was made through the alveolus of the extracted tooth, followed by syringing. Finally, incision along the medial portion of the orbital edge and evacuation of a large quantity of fetid pus, mixed with blood, coming from a subperiosteal abscess in the orbital roof, which was almost entirely bared of periosteum, and the posterior part of which was uneven and rough. Xeroform gauze tampon. Compress. Evening temperature, 39.5° C. Rather restless, perhaps not quite clear in mind.

August 9th. Morning temperature, 37.4° C. On syringing the maxillary sinus some of the liquid came out through the orbital wound. There was considerable emphysema of the skin over the left side of the face, especially in the temporal region. During the following days the condition was more or less unchanged. Evening temperature, above 39.0° C. Rather restless on the night of August 11th, when she was transferred to the Ear and Throat Department.

Here the syringing was continued. The temperature remained steadily high: 38 to 39.8 degrees C. An abscess formed in the right eyelid and was lanced on August 15th. General convulsive twitchings on the night of August 18th. Next morning somewhat delirious; pulse, 160. On August 19th lumbar puncture and evacuation of a turbid fluid from which diplococci developed in broth. Increasing unconsciousness. Died on August 20th. Postmortem refused.

Epicrisis.—It can scarcely be doubted that the acute maxillary sinusitis on the left side arising from the teeth was the starting point for the subsequent fatal complications. The course of the malady proceeded with sinister rapidity, seeing that only fifteen days elapsed from the time the tooth was extracted till death supervened.

The inflammation seems to have transferred itself from the maxillary sinus through the roof of the latter to the orbit.

owing to there being an open communication between these two cavities (previously formed opening? Destruction?). This is indicated with certainty by the fact that some of the liquid used in syringing came out through the incision that had been made above the eye. By what channel and in what manner the inflammation further extended to the *cavus cranii* cannot be determined, as no postmortem examination was made.

That meningitis was present appears with certainty from the clinical observations. These afford no foundation for the assumption of the presence of other intracranial complications. We should not, however, for that reason exclude the possibility of such complications being revealed by a post-mortem examination.

Case 6.—Erling, B., fourteen years old, admitted September 17, 1913; died September 29, 1913. On Christmas, 1912, he had a gumboil in the upper part of the mouth on the right side, where two premolars were extracted. At the same period he also had a purulent discharge from the nose on the right side. There has since continued to be a little swelling of the face. About a month and a half ago he went to a physician, who punctured and syringed the right maxillary sinus, and this was afterwards repeated five or six times. During the syringing pus and blood were obtained. Last night he had a grinding pain in the right eye, which this morning was somewhat swollen. The swelling has since increased rapidly, so that he now cannot open the eye. No headache, chilly sensations or other phenomena.

Condition on September 17, 1913: Pulse, 104; temperature, 38.4° C. (armpit). Right cheek somewhat swollen, but no tenderness. Considerable edematous swelling of both eyelids, especially the upper one on the right side. The eye could not be opened. No swelling or tenderness over the frontal sinus. The upper jawbone seemed to be somewhat thicker on the right side than on the left. No fistula at the site of extracted premolars.

Anterior rhinoscopy: On the right side the mucous membrane was greatly swollen and infiltrated. The nasal cavity is somewhat contracted owing to a crista septi. There was a quantity of thick mucopus, which was specially localized to

the middle and lower nasal passages. On the left side the mucous membrane was likewise swollen, and there was hypertrophy of the inferior turbinate.

Posterior rhinoscopy: In the nasopharynx mucopus was seen, especially on the right side, and some secretion was noted in the middle meatus.

September 18th. Has slept quite well. Feels comparatively well. Temperature, 38.3° C. Some chemosis conjunctivæ. Double vision on looking very far to the side and also in an upward direction. On puncture of the right maxillary sinus from the lower nasal passage thick, yellow, fetid pus dripped out through the trocar tube immediately after withdrawal of the needle. Radical operation of the sinus maxillaris dexter under chloroform narcosis.

The cavity contained large quantities of granulations. An iodoform gauze tampon was introduced through the nose.

September 19th. Temperature yesterday evening, 39° C.; today, 38° C. This forenoon, chills and vomiting, with rise in temperature to 39.7° C. Since yesterday drowsy but clear minded. Complained of headache. Edema over eye somewhat increased. Operation of the right sinus frontalis under ether narcosis.

The integument was very edematous. Frontal sinus was opened through the anterior wall. The cavity contained pus and mucus, as well as granulations. Upper part of processus frontalis maxillæ superioris was removed. The anterior ethmoidal cells were full of granulations and were removed. Iodoform gauze tampon, introduced down through the nose.

September 21st. Has felt somewhat better since the operation. Temperature yesterday, 38.3° C. to 37.5° C.; today, 37.1° C. Still much swelling of upper eyelid.

September 22nd. Temperature, 39.5° C. In the lateral part of the upper eyelid there was a perforation, through which a large quantity of fetid pus was discharged. In the inner part there was a necrotic area as large as a 10-öre piece, from the edges of which fetid pus was discharged. Between these two areas the eyelid shows bluish discoloration. Severe chemosis conjunctivæ. A transverse incision was made in the upper eyelid. The tampon in the nose was removed. Compress with boric acid solution.

September 23rd. Temperature, 40.2° C. to 40.9° C. Last night patient had pain in the right side and dry cough, rigor, no headache, perfectly clear mind. Examination of chest: On the right posteriorly and inferiorly there were slightly muffled sound and weakened respiration. Around the papilla mammae typical harsh sound as of rubbing. Profuse secretion from abscess in eyelid.

September 24th. Condition more or less unchanged; rigor attack in the forenoon.

September 25th. Muffled sound on the right chest posteriorly more pronounced. Counter incision outwards of the right eyelid.

September 26th. Exploratory puncture of right pleura; opaque yellow liquid discharged.

September 27th. Had a bad night with constant coughing. The pulse has, as during the preceding days, been between 100 and 120, but went up to 144 last night. Respiration, which during the preceding days was from 36 to 40, mounted to 44. After camphor injection somewhat better. On morning visit, pulse 108, regular. Respiration, 32. Icteric coloration of skin and conjunctiva.

September 29th. Puncture of the pleura with Potain's apparatus. Evacuation of about 100 cc. of fluid mixed with blood. During the day several chills with temperature 40° C. and 40.5° C. At 7:30 p. m. he had a fit of coughing, during which he coughed up a pus basinful of bright, frothy blood. Died at 8 p. m.

Postmortem examination: The right frontal sinus contained thick mucopus. The mucous membrane was thick and coated with granulations. The changes described around the right eye corresponded to an extension of the inflammation along the upper orbital edge extending outwards towards the temporal excavation on both the upper and under side of the arcus zygomaticus. The tissue here showed greenish discoloration, was infiltrated with pus, and the periosteum was partially removed. The corresponding spot on the inside of the cranium likewise showed pronounced greenish discoloration; here there was also found a scanty coating of pus. The bone of the cranium was not affected. At this spot there was also found discoloration and coating of pus on the outer side of

the dura and minute hemorrhages on its inner side, but no breaking through. Continuing from the spot mentioned there was found greenish discoloration of the orbital roof on the right side. The bone of the orbital roof was diffusely infiltrated with pus. The soft tissues in the orbit were infiltrated with thin, yellowish green, fetid pus, as in diffuse phlegmon. The inflammation was chiefly confined to the peripheral portions of the orbit. The bulbous was not attacked. From the portion of the dura mentioned a yellowish discoloration stretched upwards towards the middle line, where an abscess the size of a grain of corn was found directly on the right of the sinus sagittalis sup. The sinus sagittalis, on being opened, was found to contain, from this spot and extending inward about 10 centimeters, soft, grayish red, infected thrombi (thrombophlebitis). The other blood sinuses were intact. The right maxillary sinus contained fetid pus as well as bits of grayish green necrotic material. The mucous membrane was infiltrated with pus and partially dissolved, so that bare, infected bone was exposed to view. Similar infection was noted with fetid, gangrenous contents in the ethmoid cells and in the sphenoid sinus. Nowhere was there perforation to the base of the cranium.

The left maxillary sinus and the orbit were unaffected.

There was also found a fibrinopurulent pleuritis of the right side. In the right lung small yellowish green abscesses were found directly under the pleura. The lower part of the lung was almost wholly occupied by an irregularly formed infiltration of inflammatory nature. In this there was a gangrenous cavity almost the size of a hen's egg as well as a number of smaller ones. In these cavities there were quantities of fluid or coagulated blood which also partly filled the larger and smaller bronchial tubes. Over the upper lobe of the left lung there was a newly formed fibrinous coating. The spleen was swollen. Parenchymatous degeneration of the organs. General anemia.

Epicrisis.—Again in this case the starting point for the different pathologic changes was a sinusitis maxillaris arising out of a dental periostitis. But in this case the sinusitis was chronic, as it had existed for three-fourths of a year before the symptoms appeared that introduced the final act with its

rapid development. That the primary inflammation of the accessory sinus is to be sought for in the sinus maxillaris we may be permitted to deduce from the fact that the secretion from the nose commenced at the same time as the symptoms of dental periostitis. Theoretically, it cannot be denied that one or more of the other affections of the accessory sinuses which came to light through the operation or the post-mortem may previously have been present in a latent form. But such a supposition must be regarded as exceedingly improbable, and we shall scarcely be wrong in leaving this possibility out of consideration. Rather could it be asserted that the periostitis in the upper jaw arising from the tooth must be regarded as the actual original malady, which afterwards extended upwards, while the inflammation in the upper maxillary sinus was only a partial phenomenon. Some support for such an assumption can no doubt be found in the swelling of the upper jaw, which persisted during the whole time after the extraction of the tooth. Nevertheless, I believe it is correct to regard the sinusitis as the main malady, partly on account of the extensive anatomic changes in the antrum of Highmore that were brought to light by the postmortem, and partly on account of the course we may assume the infection to have taken, comparing the clinical phenomena with the anatomic changes revealed by the postmortem. This course seems to have been as follows:

From the maxillary sinus the infection forced its way through the roof of that sinus to the orbit, where there arose a phlegmonous inflammation of the tissue around the bulb and a periostitis and osteitis in the orbital roof. The phlegmonous inflammation then spread along the orbital edge out over the temporal excavation, where it attacked not only the periosteum but also the bone of the cranium itself (the greenish discoloration was also distinctly evident on the inner side). From here the inflammation extended to the dura mater with pronounced signs of pachymeningitis. From the temporal region there stretched a distinctly pachymeningitic stripe right up to the middle line, where a small abscess had formed in the dura. For a distance of about ten centimeters back from this abscess there was a thrombophlebitis in the sinus longitudinalis with masses of softened thrombi. This thrombophle-

bitis must be regarded as the source of the pyemic changes in the lungs and pleura. The immediate cause of death was the violent hemorrhage from the lung, caused by the erosion of a large vessel in the gangrenous part of the lung. The patient's death must, therefore, be regarded as being due to septicopyemia originating from sinusitis maxillaris with intracranial complications as a connecting link.

The inflammation in the ethmoid cells and in the frontal and sphenoid sinuses does not, judging from the anatomic discoveries, appear to have formed the starting point for the intracranial complications. It must be deemed probable that these affections of the accessory sinuses were of a secondary nature in relation to the inflammation of the maxillary sinus.

INTRACRANIAL COMPLICATIONS ARISING FROM THE SINUS
SPHENOIDALIS.

Of such complications, according to Boenninghaus, there have been recorded fifty-two cases, as follows: One cerebral abscess, twenty-seven cases of meningitis and twenty-four of thrombosis in the sinus cavernosus (with or without meningitis). Frequently we find distinct macroscopic signs of destruction in the walls of the sphenoid sinus, as in the case recorded below. When the bony walls are macroscopically unchanged, the infection must be assumed to have been brought about by a thrombophlebitis in the veins that form the connection between the venous system in the mucous membranes of the accessory sinuses and the vascular apparatus of the meninges (Hajek).

Case 7.—Karsten, S., eight years old, admitted February 3, 1914; died February 4, 1914. The patient has had nasal catarrh for a long time. On January 30th the right upper eyelid began to swell. This swelling increased rapidly so that from the following morning he has not been able to open the eye. On February 1st, a swelling over the left eye and in the forehead appeared. In the afternoon his mind began to wander, and he has since become more and more delirious. Today he is completely unconscious and the swelling has extended to the lower eyelid.

Condition on February 3, 1914: The patient unconscious, moaning and restless, and did not react when spoken to. Pulse,

180 to 190; temperature, 39.4° C. Heart and lungs showed nothing abnormal. Edematous swelling in the forehead as well as in the upper and lower eyelids on both sides. The eyes were quite closed. The skin over the right eye showed bluish discoloration. The edges of the eyelids were stuck together with a little pus. The right eye seemed somewhat protruding; chemosis conjunctivæ with extravasation of blood. He winced on pressure along the eyebrow on both sides, especially in the medial part. On anterior rhinoscopy a little dried pus was found in the middle meatus passage on both sides.

Opening of both frontal sinuses under light chloroform narcosis.

No pus was found here, nor in the ethmoid cells (the sphenoid sinus was not opened).

February 4th. The patient has been unconscious the whole time. No convulsions. He died at 4:30 p. m.

Postmortem examination: At the base of the cranium to the left of the sella turcica corresponding to the apex of the left temporal lobe there was a scanty collection of yellow, thin fluid pus. The outer walls of the sella turcica show erosion and are coated with pus. In the sinus sphenoidalis there is found a large quantity of bloody, purulent exudation with decayed bone substance. Anteriorly and above in the right orbital cavity there is a collection of yellow, thin fluid pus. There is pus along the first branch of the trigeminus on both sides in the direction of the orbits. No formation of thrombi in the veins coming from the orbits. No pus in the cellulæ ethmoidales. No diffuse meningitis, only extreme hyperemia of the whole surface of the brain. Only at the base around the chiasm is there found pus. No pathologic changes in the ossa temporalia.

In the lungs are found numerous bluish red abscesses, varying from the size of a pea to that of a hazelnut. These are hard and infiltrated. On being cut through they prove to consist of a center of separate pus foci surrounded by a hemorrhagic zone.

Bacteriologic examination: From the cardiac blood and from the spleen Gram positive diplococci developed which on being inoculated into a mouse proved to be pneumococci.

Epicrisis.—The fact that the patient had suffered from nasal

catarrh for a long time may probably be taken as indicating the presence of an old sinusitis sphenoidalis. The acute exacerbation (new infection?) proved to be of a very malignant nature. Five days after the appearance of the symptoms the patient was dead. The progress of the malady was as rapid as in the case of pneumonia. The bacteriologic examination of the blood and the spleen also showed that there was a general infection with pneumococci.

The changes found in the sphenoid sinus and its osseous walls, as well as the negative findings in the other accessory sinuses, leave hardly any room for doubt that the meningitis (and the general infection) were due to the presence of inflammation in the sphenoid sinus. (In the record of the postmortem there is nothing noted regarding the sinus cavernosus.)

The clinical diagnosis was not easy. The rhinoscopic changes were insignificant. The tenderness observed in the region of the forehead had a misleading effect, as it directed attention to the frontal sinus. The case in this respect reminds us somewhat of a case of isolated sinusitis sphenoidalis reported by Trautmann in which also an operation was done on the frontal sinus, with exposure and puncture of the dura, as well as total resection of the middle ear, as there was a chronic otitis. The postmortem revealed basal meningitis originating from the sphenoid sinus, with cavernosus phlebitis and septico-pyemia. Trautmann also draws attention to the great difficulty in diagnosis in cases of acute sinusitis with very rapid development. We may, however, find a meager consolation in the fact that no one has yet succeeded in saving a patient suffering from a suppurative intracranial complication arising from the sphenoid sinus.

INTRACRANIAL COMPLICATIONS OF UNCERTAIN ORIGIN IN CONNECTION WITH COMBINED INFLAMMATIONS OF THE ACCESSORY SINUSES.

In some cases of intracranial complications in connection with inflammations of the accessory sinuses it is not possible to determine from which sinus the contents of the cranium have been infected, because we have before us a polysinusitis or pansinusitis in which the pathologic changes do not point

to any particular accessory sinus as the starting point of the trouble.

Gerber in his work on complications of the frontal sinus has tabulated from the literature nineteen cases of this kind. All of these patients died except one, who suffered from rhinogenic pyemia and in whom the author (Grunert) conjectured the presence of sinus thrombosis.

The following case is an example of rhinogenic cerebral complication of uncertain origin:

Case 8.—Agnes, F., fifty years old, admitted February 17, 1918; died February 21, 1918. Previously she has always been in good health. Since New Year she has had nasal catarrh and was troubled with mucus in throat. On February 7th she became ill, had temperature about 39° C., and headache at base of skull, which, however, she had previously had to some degree. On February 14th herpes was observed on the lower lip. She has had slight chilly sensations, but no rigor; no cough. On February 16th she was examined in Lovisenberg Infirmary. Pulse 104, respiration 32; temperature, 39.3° C. Tongue dry and coated, slight edema on crura, stiffness in back of neck, Kernig slightly positive. There was possibly somewhat shorter percussion sound over posterior surface of right lung in the lower part; otherwise nothing noteworthy on examination of organs. Lumbar puncture with evacuation of about 10 cc. of turbid liquid. After centrifuging there was a large amount of purulent sediment, consisting of polynuclear leucocytes. Pressure: 240 mm. (after evacuation of a quantity of liquid). No meningococci nor any extracellular cocci were found.

Condition on February 17th (Ullevål Epidemic Department).—Condition as described above. Lumbar puncture with evacuation of about 40 cc. of turbid fluid. Urine: albumin positive.

February 18th. Slightly sluggish, but clear of mind. Over posterior surface of right lung a slightly muffled sound was heard on percussion, weakened respiratory sounds and a few small râles. Stiffness in back of neck. Kernig negative. Babinski negative. In the fluid obtained by puncture yesterday bacilli were found, of which some are mobile. They stain with Gram. In the culture the same bacilli are found; no

Gram negative diplococci. Lumbar puncture with evacuation of 20 cc. of diffusely turbid liquid. Blood count: 34,400 white corpuscles. Widal negative.

In the evening, lumbar puncture with evacuation of 30 cc. of turbid liquid and injection of 20 cc. of meningococcic serum.

February 20th. Condition more or less unchanged. Lumbar puncture (25 cc.) and injection of 0.20 optochin hydrochlorate. During the day she became drowsy.

February 20th. Since last night she has not been quite clear of mind. Skin and scleræ slightly yellowish in color. Since yesterday bowels moved eight times, feces very thin and passed in bed. In the evening absolutely no reaction. Lumbar puncture with evacuation of thick grayish yellow pus. In smear preparation Gram negative bacilli were found, partly intracellular and lying in heaps; possibly also some Gram positive bacilli. No growth of typhus bacilli from the feces. Death, February 21st, at 3 a. m.

Postmortem examination (only opening of the cranium was permitted): Nothing noteworthy on the outer surface of the cranium. Some hyperemia in the dura. In the soft meninges on the convexity of the brain nothing particular noted. On the other hand, at the base there was found a thick fibrinopurulent coating on the under side of the anterior part of the right parietal lobe and upwards in the fissura Sylvii. In the backward direction there was also found a very thick solid fibrinopurulent coating on the under side of the pons and inwards along the clivus on the front of the medulla oblongata. A little turbid liquid was seen in the ventricles of the brain. The brain itself showed slightly flattened convolutions and shallow sulci, but otherwise usual conditions. On the right side the sinus sigmoideus was filled with softened purulent thrombi. On resection of both middle ears these were found to be normal. The drums were smooth and specular. On both sides the ethmoid cells, as well as the frontal sinus and the sphenoid sinus, were found to be filled with thick, tough mucous pus. The maxillary sinus was not opened.

Bacteriologic examination: In the culture from the contents of the cerebral ventricles there developed a number of differ-

ent microbes, both Gram-positive and Gram-negative bacilli and cocci.

Autopsy diagnosis: Meningitis cerebrospinalis. Ethmoiditis, sinusitis frontalis et sphenoidalis suppurativa. Thrombosis sinus sigmoidei.

Epicrisis.—The symptoms of an affection of the accessory sinuses were not very pronounced in this case. They were confined to nasal catarrh and phlegm in the throat, and evidently little attention was paid to them by the patient. After there had been fever and indefinite symptoms lasting for about one week there appeared distinct signs of meningitis, the etiology of which was not clear. The presence of herpes in combination with the lack of a definitely determined starting point led to the suspicion of epidemic cerebrospinal meningitis. The bacteriologic examination of the cerebrospinal fluid showed, however, that such an assumption was not tenable. The autopsy revealed no other etiologic explanation of the meningitis than the existing inflammations in the nasal accessory sinuses.

On the basis of the description of the autopsy it is not possible to determine from which of the accessory sinuses the meningitis proceeded (sinus sphenoidalis?). As no pathologic changes were found in the temporal bones, it is reasonable to assume that the thrombosis found in the sinus sigmoideus was secondary in relation to the meningitis.

In concluding this little work, I beg the principal of the Ear and Throat Department of the Rikshospital, Professor V. Uchermann, to accept my best thanks for the material placed at my disposal. I likewise thank Dr. Ustvedt, chief physician, and Dr. Heiberg Hansteen, demonstrator in Pathologic Anatomy, for permission to make use of the case recorded from Ullevaal Hospital.

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ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Primary Angiofibroma of the Tympanic Membrane.

OKADA, W., OKONOGI, S.

J. Japan. Oto-Rhino. and Laryng. Ass., Tokio, 1918—XXIV
—253.

The writers record a case of a tumor on the tympanic membrane, examined histologically after removal of it with the ear ossicles from a twenty-two year old male, giving otoscopic and histologic colored illustrations.

T. Hoshino.

Primary Diphtheria of the Middle Ear.

SHOJI, G.

J. Jap. Oto-Rhino. and Laryng. Ass., Tokio, 1918—XXIV
—291.

In a case of middle ear suppuration, Shoji found a pseudo-membrane in the tympanic cavity, without showing any preceding symptoms of diphtheria in nose or throat. From it he definitely showed diphtheria bacilli microscopically, on cultures and by animal examination. After administering anti-toxic serum and local treatment, the discharge decreased and patient was cured. He also demonstrated the diphtheria bacilli in the patient's urine.

T. Hoshino.

Vestibular Reactions in Five Hundred and Forty-One Aviators.

LEVY, LOUIS.

J. Am. M. Ass., Chicago, 1919—LXXII—716.

The average nystagmus of accepted applicants from data given by sixty-seven physical examining units showed on turning to the right, 23 seconds, and on turning to the left, 23.1 seconds; without dividing this series by the hours of flying, the average on turning to the right was 24.6, and on turning to

the left, 24.4 seconds. It will be noted that the average nystagmus of the series is slightly higher, probably owing to the fact that there were few fliers examined with less than 20 seconds' nystagmus, while in the examining unit work there were a great many more.

It is found that nystagmus is not diminished by repeated turnings. Although vertigo was not timed, past-pointing and falling were slightly diminished in fliers of 100 hours' or more experience, being most noticeable in fliers who have had the greatest number of hours. As past-pointing and falling are objective signs of vertigo, this diminution was due to the fact that the flier had learned to interpret this vertigo and for the same reason more rapidly recovered his poise.

Emil Mayer.

Otitic Meningitis.

DENCH, E. B.

Laryngoscope, St. Louis, 1918—XXVIII—501.

The writer refers to the important relation of suppurative otitis media to the intracranial structures, and though a baffling complication is fortunately rare, statistics are hard to get.

Otitic meningitis is an inflammation of the coverings of the brain, due to middle ear infections. The simplest form is the extradural or epidural abscess occurring oftenest near the lateral sinus or middle cranial fossa, found on operation. Symptoms are sleeplessness, localized headache over abscess, tenderness on percussion, slight elevation of temperature. Examination of spinal fluid assists diagnosis. The involved dura offers a barrier to entrance of organisms into the arachnoid and pia.

"Serous meningitis" is a misnomer. Cases of meningeal irritation and meningismus are the first stage of otitic meningitis.

The disease is divided into three groups: Fulminating cases, regular or frank cases, and latent cases. The onset of the disease is sudden; other symptoms are high temperature, photophobia, internal strabismus on either side, muscular rigidity, Babinski and Kernig signs developed early, delirium, pulse

slow, ocular disc showing choked fundus, an important diagnostic aid. Spinal fluid is turbid and pathogenic organisms found on culture. Fulminating cases he calls coincident meningitis. The frank cases are easy to diagnosticate. It is difficult to draw a line between invasion of labyrinth and invasion of meninges, as the cerebrospinal and labyrinthine fluid are the same and in free communication. Caloric tests are valuable when the invasion is through labyrinth. The latent cases are seen after middle ear and mastoid operations. Symptoms are general malaise, headache, slight temperature, vomiting, some rigidity of neck, no delirium, mentality clear. Differential blood count is valuable.

The operative procedure is to remove the primary cause of the infection, expose a large area of dura with subdural drainage in fulminating cases, and frequent lumbar punctures. In case of labyrinthine invasion, the labyrinth should be extirpated and the subdural space in the vicinity of the internal auditory meatus drained. Neumann's operation is used in all cases only where the invasion is through labyrinth. Dakin's solution is of benefit in certain cases. Treatment by intravenous injections of serum or intraspinal injections or urotropin injections in the spinal canal is valueless, according to the writer. He thinks the otitic meningitis is always grave, but not necessarily fatal, and he makes a distinction between true meningitis and meningitis coincident with otitis, and advises operation in every case.

J. A. Stucky.

The Reliability of the Nystagmus Test.

FISHER, LEWIS, AND BABCOCK, HAROLD L.

J. Am. M. Ass., Chicago, 1919—LXXII—779.

The following conclusions are presented:

The duration of after-turning nystagmus is not impaired by flying. Such a very large number of aviators have been reexamined as to make this conclusion absolute and final.

From the evidence at hand, it would seem that in acrobats, whirling dancers, airdome performers, and in athletes in general, there is no diminution of the nystagmus response. More examination of such persons, however, would be necessary before any final conclusion should be drawn.

Repeated turning experiments on normal persons occasionally produce an "apparent" and slight shortening of the nystagmus, but that this is only apparent and not real is demonstrated by the convex glasses.

In medical practice, an absence or impairment of eye responses following ear stimulation definitely indicates a pathologic condition within the vestibular mechanism.

Emil Mayer.

Report of a Case of Chronic Middle Ear Suppuration, Treated by the Carrel-Dakin Method, Following a Radical Operation.

PHILLIP D. KERRISON.

Laryngoscope, St. Louis, 1918—XXVIII—537.

The writer reports a case of secondary mastoid operation, the antrum being filled with foul detritus and evidence of progressive bone necrosis. Dura was covered with granulations, tympanic vault filled with granulations, aditus enlarged by necrosis of the tympanic end of posterosuperior canal wall. Körner flap was used for the canal and the posterior wound was closed. On the table the wound was flushed with Dakin's solution and a short gauze wick saturated with the same fluid placed in the cavity. The following day instructions were given to fill the wound cavity with the solution every hour during the day, the patient lying for twenty minutes on the sound ear, then the wound was protected by sterile cotton. After the last bath at night, the cavity was filled with chlorazone paste and gauze dressing. This continued for three days.

The treatment is based on the supposition that frequent flushings with Dakin's solution will cause thorough sterilization; that chlorazone paste will prevent reinfection of a wound, and the absence of granulations is clinical evidence of sterilization. Dakin's solution is irritating to the skin, which must be protected around the wound. An illustration of a special device for using chlorazone paste was given, as it cannot be introduced successfully with a spatula.

Postoperative treatment did not lessen the time of cure, but the bony cavity seemed surgically clean from the start; there were no masses of granulations. epidermitization was rapid;

treatment was without discomfort to the patient. No stationary rubber tube was necessary, as the mastoid wound makes a natural cup. The Dakin's solution must be fresh and accurately prepared; there must be strict observance of aseptic laws and careful attention must be given to prescribed details.

J. A. Stucky.

Tests for Malingering.

KERRISON, P.

Laryngoscope, St. Louis, 1918—XXVIII—622.

The paper was limited to the application rather than the description of tests. The tests from which the writer reached his conclusions were: (1) Weber's test; (2) loud conversational voice; (3) binaural stethoscope; (4) tests eliciting incongruous variations in response; (5) noise or Lombard's test. After using all tests he concluded the most useful and exact one was made with the tuning forks. He gave reports of interesting cases of malingerers showing the different tests used and results on the man examined.

J. A. Stucky.

Ear Protectors.

RICHARDSON, C. W.

Laryngoscope, St. Louis, 1918—XXVIII—514.

Protection to the soldiers in action from injury to the auditory apparatus is of utmost importance. The writer views the subject from various points. The immediate incapacity of the affected man, his requirement of medical attention when other men needed it more, the permanent deafness, and the financial consideration are all discussed.

The injuries are caused by single detonation or by continuous sounds. They comprised rupture of the membrana tympani, organic injury, either slight or complete destruction of the labyrinth, or functional disorders of the central nervous system.

The object of the various devices considered is to lessen the concussion to the conducting apparatus of the ear, but to

allow the sound waves to reach the membrana tympani. Many types of devices have been made and many experiments conducted. Three important factors are considered in connection with the devices: Applicability, safety and cheapness. All hard and metallic forms of protectors are dangerous, because in any shot or shrapnel injury near the auricle they may become secondary foreign bodies. The Wilson-Michaelson and the Mallock-Armstrong devices are not well considered. One device called the "British Tommy" is well liked, but cannot be obtained in sufficient quantities.

Cotton saturated with glycerin or vaselin is the cheapest, most available, easiest to obtain but it deafens the wearer more than other devices.

J. A. Stucky.

Brain Abscess Following Shot in Ear.

Survey of Head Surgery, Washington, 1919—I—243.

Frank B., aged twenty-three years, Sixth Training Battalion, 154th Depot Brigade, was shot in the left ear January 1, 1917, with a 32-caliber revolver. He was in a hospital fifteen days following the shooting. It was not known whether any attempt at extraction of bullet was made at this date. For the past year has had sudden severe attacks of pain, but which lasted only a moment or so. There has been more or less constant discharge from the left ear since his injury. Otherwise his health has been fairly good.

On April 27, 1918, after a twelve mile march, he developed severe pains in left side of head, and on the same day had a generalized convulsion.

April 28th. Admitted to base hospital at Camp Meade, Md., with a hemorrhagic discharge from the left ear. There was a scar just in front and above the auditory canal with sufficient atresia of the canal to make a view of the drum impossible. There was no tenderness or swelling over the mastoid, but there was a partial paralysis of left facial nerve involving the whole distribution.

April 29th. Temperature, 102; pulse, 106; respiration, 20.

April 30th. Temperature, 98; pulse, 76; respiration, 18.

May 4th. Had an epileptiform convulsion, but was not seen at the beginning of the attack. Has had intermittent severe

left sided headache since admission. Temperature, 98.6; pulse, 100; leucocytes, 11,000. Condition was diagnosed as traumatic epilepsy, by consultant, and if bullet is present, removal of same was advised.

May 5th. X-ray showed the presence of a bullet in the petrous bone, which later was localized as being forty millimeters in from the skin surface, at a point just above the tragus. Examination of eyes showed both fundi normal.

May 8th. Condition of patient remained about the same. Temperature, 98.4; pulse, 64, and he was discharged from the hospital to command with the view of rejection from military service.

May 11th. Was readmitted to base hospital, Camp Meade, Md. Patient distinctly drowsy. Temperature, 98; pulse, 52; respiration, 18. Had intermitting headaches. Reflexes on right side increased, but there were no signs of paralysis.

May 12th. Very drowsy and apathetic. Temperature, 98; pulse, 46. Lumbar puncture showed clear spinal fluid under pressure. Laboratory report: No microorganisms.

May 13th. Still drowsy, with pulse of 50, but no localizing symptoms. Blood pressure: Systolic, 105; diastolic, 65; leucocytes, 13,000; polymorphonuclears, 60 per cent.

Operation Under Ether.—A radical mastoid operation was done, and after removing the upper part of the anterior canal wall the bullet was found and extracted. It was lying internal to tympanic cavity and under the dura on the anterior surface of the petrous bone. It was surrounded by considerable cholesteatomatous material, and there was some necrosis of the surrounding petrous bone. No extradural abscess was found. The mastoid process was sclerotic. There were several small pieces of lead embedded in the posterior canal wall. The middle ear cavity was filled with granulations and cholesteatoma. The wound was packed open with iodoform gauze without suturing.

May 23d. Up to this date patient had been doing fairly well, with normal temperature and pulse running between 62 and 78. The wound lately had been discharging freely, and there was a peculiar nasty foul odor to it. This date he had an epileptiform convulsion which lasted one and one-half minutes and was followed by unconsciousness for two hours. Re-

flexes were markedly increased during the attack, followed by complete paralysis of right arm and leg which persisted. Leucocytes, 12,600; polymorphonuclears, 86%; temperature, 98; pulse, 60; respiration, 18.

May 24th. Eye examination showed no pathologic changes in fundi. Wassermann negative. Blood pressure: Systolic, 117; diastolic, 70; temperature, 98; pulse, 84. Hemiplegia complete.

May 30th. For a few days there had been a slight movement of right arm but none in leg. The last few days patient had been getting more and more apathetic, and today he slept most of the time. Temperature, 99.8; pulse, 60; respiration, 20.

May 31st. General condition was worse, and examination of eyes showed choked disc left side.

Operation Under Ether.—A horseshoe shaped flap was turned forward, baring the squamous portion of the temporal bone, just above the old mastoid wound. The mastoid wound was enlarged upward and forward until a large part of the squamous plate was removed. The dura was elevated from the interior surface of the petrous bone but no extradural abscess was found. The dura was freely incised and the brain found under great pressure, so that it immediately protruded through the dural opening until a large hernia developed. Bleeding was very free and difficult to control. Search was made for brain abscess, but none was found. The skin flap was sutured over the hernia and the patient returned to the ward in a very critical condition.

June 1st. Right sided hemiplegia was still present, and since operation patient had become aphasic. Temperature, 101.8; pulse, 130; respirations, 18.

June 4th. Except for hemiplegia, patient's condition was much improved since operation. This morning he had a convulsion lasting two minutes. The brain hernia was very large and the skin wound was breaking open. Eye examination: Right nerve was only blurred, but left shows optic neuritis of 3-D and a hemorrhage on outer edge of disc. Leucocyte count, 7,400, with 80 per cent polymorphonuclears.

After the above date patient gradually became brighter mentally, though his hemiplegia and aphasia remained about the

same. At times some movement of the right hand was noticed. A greater part of the hernia sloughed away, and the suppuration and odor were only checked by wet dressings of one-half per cent formalin. Temperature ranged between 98.8 and 103.4, and pulse between 88 and 120, usually about 100 for temperature and 104 for pulse.

July 13th. Eye examination showed in the right an optic neuritis with about plus 1-D, and the left about 3-D.

July 15th. About one and one-half ounces of pus was evacuated from hernia by introducing a pair of forceps. General condition good, but no improvement in aphasia or paralysis.

July 29th. The paralysis was becoming spastic in character, although the right side of the face seemed to have cleared up. Still aphasic.

August 18th. Drowsy and hard to rouse; temperature, 104; pulse, 132; respiration, 30. Hernia was more prominent and there was a marked tremor of left hand and shoulder. Abscess cavity was explored with finger, and it seemed to pass in through the skull wound and probably communicated with a deeper abscess.

August 31st. Patient improved after evacuating abscess cavity, though the tremors in left arm occurred occasionally for a short time.

September 3d. Last night temperature rose suddenly to 105.2° F.; pulse, 140; respiration, 48. Has had tremors left arm for two days, but otherwise seemed same as usual and looked better. Lungs and abdomen clear, no Kernig. Left Babinski and Oppenheim positive. No stiff neck. Left eye seemed blind and neither pupil reacted to light. Right pupil larger than left. Slight left internal strabismus. Pus was said to come from his mouth last night, but no abscess in throat seen. Right ear normal.

September 19th. Remained stuporous without rise in temperature until death at 12:45 a. m.

No pathologic changes of moment found outside of the head, with the exception of acute parenchymatous nephritis and parenchymatous degeneration of liver. The skull shows an operative defect including the mastoid and part of the squamous portion of the left temporal bone and part of the left parietal bone adjacent. No evidence of acute meningitis.

Firm dural adhesions over the left hemisphere. Three large abscesses found containing yellow purulent material, one in the left frontal, one in the left parietal and one in the left temporal lobe. The one draining through the wound was the largest and involved the left frontal and anterior portion of the left parietal lobe. The brain tissue in the hernia was necrotic. The operative canal in petrous portion is small and the bone necrotic, so that the canal communicates with the subdural space on the medium part of the anterior surface of the petrous portion of the left temporal bone, where the dura is attached and greatly thickened. Culture of pus from abscess shows the streptococcus viridans.

There are several very interesting features about this case. From the autopsy and operation it is apparent that the bullet, which was carried by the patient for one and one-quarter years without apparent complication, was lying immediately under the dura, having traversed through the middle ear, leaving a partially unhealed track with cholesteatoma and necrosis. The acute symptoms followed immediately after a fairly strenuous march, but there was no clinical evidence of brain abscess until several weeks later. It is fair to assume, however, that the infection of the brain had started before the first operation and was due directly to the diseased process, which in turn resulted from the foreign body. The most interesting clinical phenomenon was the sudden complete hemiplegia, which followed the convulsion of May 23d. Though at the time this condition could not be accounted for, it is probable that a deep lying abscess, gradually extending, had reached the internal capsule, and the convulsive movements had produced enough increase in pressure to rupture its fiber. When the autopsy was done several months later, the suppurative process had so advanced that it was impossible to draw any conclusion as to the original seat of the lesion producing the hemiplegia. Another remarkable feature of the case was the fact that life existed without a great deal of mental disability, with almost complete destruction of one cerebral hemisphere. There was only a small portion of the occipital lobe remaining still intact in the left hemisphere. The relief of intracerebral pressure afforded by the large decompression operation was undoubtedly responsible for the prolongation of the patient's life.

Trauma of the Auditory Apparatus.

ABRAND, H.

Rev. hebdomadaire de laryngologie, etc., Paris, 1918—XXXVIII—433.

Wounds of the external ear are given a single paragraph. One interesting feature common to all is the possibility of stenosis and this should be guarded against. Trauma of the internal ear likewise is briefly discussed. Abrand admits having seen a few cases of traumatic labyrinthitis resulting in permanent deafness, but he has also seen a host of cases of deafness suggested by imprudent words, maintained and encouraged by useless treatment, especially in soldiers who prefer not to return to duty. His paper is mainly devoted to wounds of the tympanic membrane and cavity. For these wounds the essential etiologic factor is a near, violent explosion. Differences of pressure seem to be more important than the loudness of the noise. The caliber of the projectile does not seem to be important, but 150 and 210 mm. shells are frequent causes. Usually only one ear is affected, but occasionally both are concerned. Subjectively the patient complains of impaired hearing, tinnitus and pain. The tinnitus is of various sorts, lasting only a few moments in mild cases to an indefinite period in severe ones.

Impairment of hearing is obviously in relation to the extent of injury. It is interesting to note that the Rinne is positive, even with a rather extensive tympanic lesion, if the membrane is healthy, but, if the least inflammation has set in, the Rinne is negative. The Weber corresponds to the Rinne. Several types of injury to the tympanic membrane are found. In one type the drum is merely reddened slightly and lusterless; symptoms are slight and fugitive. In a second class, at some point on the tympanic surface is seen a brown ecchymosis, which gradually becomes yellowish green and disappears, leaving a little deposit or a so-called calcareous spot. In a third type the membrane has several brown, sharply delimited spots. They are not ecchymoses but blood crusts. They persist for a month or two and leave a whitish spot. One seat of predilection is over the malleus. Tympanic ruptures are included in a fourth class. Sometimes the tissue about the rupture is swollen and may mask the wound. The amount of

hemorrhage depends on the location of the perforation, being greater in ruptures near the malleus and near the tympanic ring. It has been stated that the rupture is seen most often in the upper posterior quadrant, but Abrand cannot confirm this. He sees them very frequently below the umbo; his illustrations show them in various other situations. They take various shapes and have their axes variably placed.

The course depends on type. The first three types, the superficial lesions, are anatomically cured in a week to two months. Lesions of the fourth type, if not infected, may heal completely or leave a perforation or cicatricial contraction. Infection is common and may arise spontaneously, or may be caused by a reawaked chronic infection or by lavage. Lavage is therefore to be avoided in early treatment. It is sufficient merely to cleanse the concha and meatus with alcohol or ether, plug with sterile cotton and put the patient away from noises. Slightly antiseptic nasal inhalations may be of some service.

—Survey of Head Surgery.

Classification of Deafness by Degrees; Practical Method of Evaluation of Auditory Acuity with Respect to Military Service.

ESCAT, E.

Rev. hebdomadaire de laryngologie, etc., Paris, 1918—XXXVIII.

At present the medical examination for service in the French army recognizes only three classes with respect to hearing. The first class comprises those who hear whisper at a minimum of 0.5 meter, voice at a minimum of 5 and loud voice at a minimum of 10. For the second class the foregoing are taken as maxima, and the minima are 0.12, 1.25 and 2.50, respectively. The third class comprises those falling below the latter figures. Those in the first class are fit for active service; those in the second class are assigned to auxiliary service, and those in the third class are placed in either the exempt or disability group. Escat proposes to establish six classes with more refined distinctions, which are set forth with painstaking detail. By his classification recruits could be assigned with greater exactitude to their appropriate duties.

—Survey of Head Surgery.

Osteosclerosis of the Temporal Bone in Chronic Suppuration.

GRAHAM, H. B.

Laryngoscope, St. Louis, 1918—XXVIII—872.

In 1907 Dr. Cheatle of London found osteosclerosis in non-suppurating ears and concluded it was an embryologic condition of the mastoid process. The antral wall was thickened, but in many cases became thinner as the diploe of the mastoid developed, and the sclerosis was not due to bacteria but to an anatomic peculiarity which could contribute to chronic suppurative ears. In operating he has chiseled through sclerotic bone which the microscope proved normal. There may be normally a solid mastoid, but the writer's experience does not prove it. Where we have a chronic suppurative ear we may have a true osteosclerosis, which is the result and not the cause of suppuration. He has found no case of chronic unilateral suppuration showing evidence of embryologic sclerosis, and in cases of long standing the thickening of the mastoid process has extended to the petrous portion of the temporal bone. He presented a number of X-ray plates and described his process of taking X-ray pictures of the mastoid.

J. A. Stucky.

II.—NOSE.

Extradural Abscess in Chronic Frontal Sinusitis.

TADOKORO, K.

J. Japan. Oto-Rhino. and Laryng. Ass., Tokio, 1918—XXIV—261.

During Killian's operation on the frontal sinus, he found a fistula in the cranial wall, which otherwise appeared healthy, in a patient complaining of headache, swelling in the frontal region, and later exhibiting fever. It was diagnosed as a left chronic frontal sinusitis, both rhinoscopically and skiagraphically. Removing this bony wall, he found a space the size of the tip of the thumb, containing bad smelling pus of the same character as that in the sinus, and also with staphylococci in

cultures. The granular mass of the dural membrane was carefully curetted. The patient recovered.

Since the writer found no congenital fissure in the walls nor any obliteration of the natural course of the sinus, he claims that these complications of extradural and subcutaneous abscesses might have been caused by osteophlebitis. He is led to doubt in this case the opinion of Hajek, who holds that the obliteration of the natural course of the sinus has important bearing on the destruction of the wall. T. Hoshino.

Anaphylaxis Due to Pollen Protein, With a Report of the Results of Treatment in the Hay Fever Clinic of the New

Orleans Charity Hospital.

SCHEPPEGRELL, WM.

Laryngoscope, St. Louis, 1918—XXVIII—853.

The writer divides the subject under: (1) Anaphylaxis, (2) treatment, (3) diagnostic tests, (4) prophylactic treatment, (5) curative treatment, and (6) hygienic measures.

Anaphylaxis.—Hay fever is due to the absorption of protein contents of pollens inhaled from anemophilous plants and the toxin substance liberated by proteolytic action of the cells on pollen protein. Some causes are due to vasomotor disturbances; the prophylaxis in such cases is to avoid the exposure which causes anaphylactic symptoms. Pollens of hay fever are atmospheric; however, the proteolytic enzymes digest protein of the pollen slowly enough not to disturb functional equilibrium, but in hay fever patients the entrance of pollen protein by parenteral channels is so rapid that the products act as toxins. Usually hay fever is produced by entrance of pollen through the nasal passages, but it can be produced by applying these pollens to scarified skin. Another cause is the distribution of the nerve branches from the sphenopalatine ganglion over the turbinates with its connection with the pneumogastric nerve. Sensitiveness to the effects of pollen may be congenital, but the real development of the disease is the result of an excessive amount of pollen inhaled, producing an anaphylactic condition which makes one sensitive to that pollen; or it may result from nasal or systemic disturbance lowering resistance to pollen sensitization.

Treatment.—A number of cases were treated only with pollen extracts, bacterial vaccines, or a combination of both, the average result being satisfactory. Diagnostic tests were to determine the character and degree of hay fever reaction.

Prophylactic treatment consists in injecting into the patient the pollen to which he was the most sensitive and would be exposed, beginning six weeks before the causative pollen season, with small doses and increasing the amount.

Curative Treatment.—Best results were obtained by combination of pollen and vaccine therapies, and in some cases autogenous vaccines were used. Bacterial vaccines were used when indicated. Patients were instructed not to eat food causing anaphylactic disturbances.

Hygienic measures used are most important.

J. A. Stucky.

The Orbital Sinus Wounds of War.

VACHER.

Ann. d'ocul., Paris, 1918—CLV—241.

In the Soc. d'Ophth. of Paris, March 19th, Vacher divided the orbital sinus wounds into two classes: those with foreign bodies and those without. In the first case, it is necessary to be certain of the presence of the foreign body by means of radiography and by the electric magnet. The diagnosis of the wounds without foreign bodies is easy by studying the direction of perforation and the tissues traversed. In the case of orbitosinus wounds without apparent lesions and with preservation of vision, he counsels against intervention or probing if radiography and radioscopy do not reveal a foreign body and no suppuration is present.

For suppuration of the orbit and the frontal sinus Vacher advises: 1. Aseptic cleansing of the region. 2. If the wall is simply fractured without endocranial complication, not to proceed to its repair until one is sure that there is no suppuration. 3. If the wall is crushed, to remove all free fragments, preserving those which are adherent and lightly tampon the sinus. 4. To stop the tamponment when all is normal and there is no suppuration. 5. If the cavity suppurates, to drain through the nose by enlarging the nasofrontal canal.

Wounds of the orbitomaxillary sinuses are less dangerous than those of the frontal. In order to drain the maxillary sinus it is sufficient to remove the internal wall close to the floor of the nose, thus transforming it into a true accessory cavity of the nose. Wounds of the ethmoids and orbit are always difficult to treat and require the attention of a rhinologist, which is also true of wounds of the sphenoid.

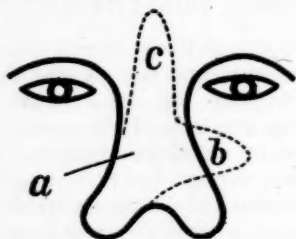
—Survey of Head Surgery.

**Pedunculated Local Nasal Plastic by Means of Bipointed Flaps;
Secondary Defect of the First Point Covered
by the Second Point of the Flap.**

ESSER, J. F. S.

Deutsch. Ztschr. f. Chir., 1918—CXLIII—385.

Esser reports the successful repair in three cases of loss of the tip of the nose, and in two of these cases of the superficial portion of the septum also, by means of a bipointed flap, one



point of which, c, is taken from the bridge of the nose, while the other point, b, is taken from the side of the nose and the cheek. These two flaps must be of exactly the same size and shape, as the transverse flap b, with a torsion of 90 degrees, is brought down to make the tip of the nose and the septum, after which the point c, from the bridge of the nose, is placed in the secondary defect of the transverse flap. The wounds in Esser's cases healed primarily. Esser recommends this method of repair because a flap taken from the bridge of the nose, the secondary defect of which is easily closed, would have necessitated a torsion of 180 degrees, which endangers the life of the flap, while a flap with a torsion of 90 degrees, taken only from

the side of the nose and the cheek, is apt to leave the wing of the nose distorted and lower eyelid everted. The bipointed flap avoids the disadvantages and combines the advantages of both flaps.

**Treatment of Blocked Nasal Ducts From the Rhinologic Standpoint,
With Special Reference to Toti's Method.**

FISCHER.

Ztschr. f. Augenh., Berlin, 1918—XXXIX—1.

The writer has so far performed Toti's operation in twenty-three cases, and his results have convinced him that this procedure deserves more consideration than it has yet received.

The principle of Toti's operation is the removal of the nasal wall of the tear sac through a skin incision, and, corresponding to this opening, to make a window through the bony wall into the nasal cavity, through which the tears can flow into the nose.

The author much prefers local anesthesia, using for infiltration novocain 0.5, suprarenin 0.002, sodium chlorid 0.6, in water 50.0. With this, particular attention is paid to getting the solution well under the periosteum in several places. Of course with young children and very restless persons, general anesthesia is required.

It is quite important for the success of this operation that the puncta and canaliculi be in a normal condition, neither blocked by fibrous tissue nor slit. In three of the twenty-three cases on which the author performed Toti's operation both canaliculi had been slit and the desired result was not obtained.

In seventeen of the remaining twenty cases there was, after the operation, a good working passage into the nose; the other three allowed the easy passage of a sound but not free passage of liquids. The greater number of these cases being soldiers, it was impossible to follow up later conditions in but a few instances; seven in varying periods from five to thirteen months continued to have very good function in the passage of tears on the operated side.

Although the pus secreting mucous membrane of the sac is left in place and not excised as in an extirpation of the tear sac, yet after Toti's operation the purulent discharge drains

downwards into the nose and leaves the eyeball out of danger.

In seventeen of the twenty-three cases reported, the author from rhinologic examination is of the opinion that the condition of the nose, particularly ethmoidal disease, was the primary cause of the blocking of the nasal duct. This proportion agrees with the findings of Kuhnt, Brunzlo, Rhese and Shuster, but differs from those of West, who in over four hundred and eighty cases of tear sac disease found nasal involvement only in rare instances. However, the author thinks that in a blocking of the nasal duct due to trouble in the nose it is not sufficient simply to remove the nasal disease to restore the passage of tears.

The only objection to Toti's operation is the resulting scar in the skin. Against this is the statement of West that in his intranasal operations (practically the same as Toti's operation, only making the opening into the tear sac from the nasal side) is contraindicated in little children, elderly people and where there is a closure of the nasal passage by fibrous tissue. Also submucous resection must sometimes precede this intranasal operation.

—Survey of Head Surgery.

Plastic Operations After Injuries to the Face and Jaws.

VOECKLER, T.

Deutsch. Ztschr. f. Chir., 1918—CXLIII—298.

Voeckler, in this article, omits all details of the primary treatment of war wounds of the face and jaws, and limits it to the discussion of five types of plastic procedures. He considers:

1. The removal of scars with or without fistulas or other malformations.
2. Operations upon slit-like defects and cicatricial contractions of the upper and lower lip.
3. The repair of parts of the nose.
4. The repair of the larger defects of the upper and lower lip as well as of the chin.
5. The covering of bone defects of the lower jaw.

The success in the complete removal of scars with or without fistulas or other malformations depends largely upon the thoroughness of the excision of the scar tissue and the method

of suture. The suture, in order to give satisfactory results, should always be made in the edges of the skin which are perfectly smooth; this is possible only when the scar tissue has been completely excised. Although any secure suture of fine stitches will probably be satisfactory, Voeckler prefers an interrupted suture of lead plate (nickelin) made over "nickelin" plates about the size of a finger nail, in order to be able closely to pull the edges of the skin together without injury to them. If the scar is combined with a fistula into the oral cavity the latter must be removed. The thickened edges of the hole in the mucous membrane are refreshed; enough material to cover the defect can always be obtained by careful, smooth dissection. Recurrences of the scars are prevented by avoiding a skin suture directly over the mucous membrane suture; either layers of tissue must be placed between the two suture lines or a flap must be made to close the outer defect. According to Voeckler's experience, the subcutaneous scar tissue serves very well for a layer to be packed between the mucous membrane and the skin when it seems advisable to repair the condition at one operation. In this case flaps of the scar tissue with adhering musculature pedunculated near the mucous membrane suture are brought together to cover the deep suture. They not only form a protective covering for the mucous membrane, but also fill out the cheeks and prevent the skin over the scar from sinking in. If necessary, a number of flaps may be piled up on one another; the skin is sutured together by interrupted "nickelin" sutures over "nickelin" plates. Funnel or trough shaped scars which are apt to be caused when the flap is taken from the neck, as its skin is without fat, may be improved by fat transplants. The flap of adipose tissue which should be generously measured, as it shrinks subsequently, is taken from the adipose tissue of the abdomen, cut to the proper size, and by means of the smallest possible slit, made under the scar, it is slipped in beneath the cicatricial tissue.

The defects of the gum which persist as communicating openings between the nasal and oral cavities may best be repaired by means of a tongue or rectangular shaped flap taken from the immediate edges of the hole, rotated about 50 degrees, and planted into it. The flap must be considerably larger

than the defect in order surely to cover the hole in the bone and must be furnished with a very broad pedicle, as the danger of sloughing is great.

Voeckler's method of closing slits and removing ugly contractions of the upper and lower lips is similar to the operation for harelip. A sunken or shortened under lip is raised by either of two methods: after refreshing the margins of the cleft, lateral incisions horizontal to the primary incisions lengthen the margins of the wound; the points of tissue made in this way are notched and sewed together staircasewise. In certain cases, however, an incision is circled about the under lip and the chin, the whole chin is separated from its under layer, swung upwards a few degrees and fixed in the new location. In other more difficult cases a number of flaps must be transplanted and shifted in order to restore the lip.

Cases in which parts of the nose, half or the entire lip or the soft parts of the chin are missing are repaired by means of pedunculated flaps from the cheeks, by the transplantation of pedunculated flaps from under the arms, or, less successfully according to Voeckler's experience, by free transplantation. The tip of the second toe, transplanted after the wound to the nose had been refreshed, satisfactorily replaced the missing point of the nose. As frontal flaps may leave unsightly scars, pedunculated flaps from under the arm are recommended for nasal plastic, either for the repair of the alæ or in cases of severe traumatic saddle nose. In a case of the latter which is reported a three-cornered piece of cartilage was inserted under the arm and the flap later placed on the nose.

When a large part of the lips has been lost, the reparative plastic flap should not be taken from the area immediate to the defect. Voeckler has not adopted the Lexer method of bringing the material down from the scalp by means of a wide flap pedunculated from in front of the ear, as one case which he treated in this manner suffered from paralysis of the facial nerve. The author prefers flaps from beneath the chin to cover the large defects of the lips. If enough mucous membrane cannot be secured to cover the defect the chin flap must be skin grafted before it is sutured in place. After the graft has healed in place its pedicle is cut through, replaced, and sutured

into the defect. In covering still larger defects a shield of rubber or metal fastened upon the jaw so that the flap may heal over it prevents primary depression and shrinking. If parts of the chin and the middle portion of the jaw are torn away, the defect of the mucous membrane is too large to be covered by unfolding and distributing its edges; pedunculated flaps which are covered by skin on both sides, one side of which is turned toward the oral cavity to replace the mucous membrane, must be sutured in place. Such flaps may be secured: (1) By covering the wound surface of a pedunculated flap with small epidermal grafts; (2) by turning the two wound surfaces of a long flap upon each other, and (3) by suturing the wound surfaces of two pedunculated flaps so that they will heal together. The pedicle of the flap cannot be cut until it is healed in place and its circulation has been thoroughly established; for this at least three weeks must be allowed. In the majority of his cases Voeckler has made these skin covered flaps by cutting a rectangular skin and adipose tissue flap from the inner side of the upper arm and the breast wall; he cuts loose only two sides of the flap, although it is entirely loosened from the layers beneath. The incisions are so located that the flaps can have their raw surfaces against one another; in this position they are sewed together while the arm is bandaged to the trunk. After healing has begun the bridges on the breast side and those on the arm are cut in a number of points until the flap is attached only to the arm by one of its shorter rectangular edges; after implantation, during the process of healing, the arm is fastened on to the head by means of a plaster of Paris dressing as in the cases of nasal plasty.

For the repair of the missing parts of bone of the upper jaw, Voeckler prefers a piece of bone from the crest of the ilium of the same individual, as periosteum and spongiosa can almost invariably be removed with it. After fitting the transplanted bone into the defect by means of grooves, he sews it fast with wire sutures.

Thirty-seven figures admirably illustrate the technic of Voeckler's operations and the results of the facial plasty with which he has reason to be pleased.

—Survey of Head Surgery.

Bacteriologic and Clinical Aspects of Infection of the Accessory Sinuses of the Nose.

BABCOCK, J. W.

Laryngoscope, St. Louis, 1918—XXVIII—527.

The investigation was attempted to correlate the bacteriologic findings with clinical types of sinusitis, aiding to make early prognosis and selective treatment. After many interesting experiments the writer concludes that the pneumococcus is always associated with acute sinusitis and streptococcus with the chronic cases, and staphylococcus with both. In the different groups of acute cases there was little difference in treatment and results. He does not agree with Turner and Lewis that the presence of streptococcus always justifies a bad prognosis. The staphylococcus group had the longest average duration of treatment and low percentage of cures with high percentage of operations.

The writer's definite conclusions are: The bacteriologic findings are not great aids in determining treatment in acute cases, but are valuable in chronic cases and have proven of great interest.

J. A. Stucky.

III.—PHARYNX AND MOUTH.

Cancer of Tongue: Bradshaw Lecture.

POWER, D.

Brit. J. Surg., London, 1919—VI—23.

Tobacco, alcohol and syphilis, the writer shows, are closely associated in the causation of cancer of the tongue. At the present time syphilis is more prevalent than it has been for many years, and the consumption of tobacco has risen from 7,500,000 pounds in 1914 to 8,500,000 pounds in 1915. Much of this tobacco is smoked in the form of cigarettes, and women now smoke on a much larger scale than they used to do. It follows, therefore, that if matters are allowed to continue as they are doing, there will be a huge increase in the number of patients suffering from cancer of the tongue. The increase should begin about 1950, and it should affect women as well

as men. The writer claims that such an increase can be prevented by a thorough and systematic treatment of syphilis in its initial stages; for, cancer of the tongue has always increased in frequency some years after syphilis has been treated inadequately. Persons who are being treated for syphilis, therefore, should be told never to smoke, not to drink to excess, and to make regular visits to a dentist in order that their teeth may be kept in the best possible state, and that any dentures they may have to wear should be maintained well fitting and free from rough edges. Such advice should be given while the patient is actually under treatment for syphilis. It is useless to defer it until the tongue has become sore, because it is then too late in a large number of instances.

Emil Mayer.

Gingival Septicopyemia.

DUTTON, W. FOREST.

Med. Rec., N. Y., November 23, 1918.

Gingival septicopyemia is a local condition of the gums which rapidly becomes constitutional and is characterized by chills, fever, great prostration, hypertrophic, spongy, suppurating and hemorrhagic gums, rapid hemolysis, acute nephritis, hemophilia, coma, and death.

The predominant etiologic factors are pyorrhea alveolaris, traumatism, gingivitis, and alveolar abscess. The disease may occur following infection from a pick, brush or other foreign body causing an abrasion, laceration or permeable lesion. It is an infectious disease in which staphylococci, pneumococci, Klebs-Loeffler bacilli, Vincent's organisms, streptococci (hemolysans, pyogenes, or viridans), actinomycoses, and other bacteria may be present.

Attending the etiologic factors the following symptoms will be found: Painful, tender, foul-smelling gums which rapidly become greatly swollen and spongy; chills, fever and great prostration; oozing of pus and blood from the gums; oftentimes hemorrhage from the stomach, bowels and kidneys. Cerebral hemorrhage followed by paralysis is not uncommon. The skin is pale, pasty, and frequently of a cadaverous character. The patient may become delirious and carphologia is

noted. Pain varying from mild to excruciating in various parts of the body is a common symptom. The urine is usually highly colored, albuminous, showing hyalin and waxy casts, and often much blood. Coma, as a rule, intervenes some time before death.

The prognosis is grave. Acute cases end fatally in three to five days. The subacute cases succumb within two to eight weeks. The diagnosis of this condition is not difficult, as the source of the infection can easily be recognized. The only condition that may be confused with this disease is scorbutus. Scorbutus has many parallel symptoms, but is insidious and due to dietetic factors. At an early stage gingival septicopyemia is plainly in evidence. The occurrence of rigors, fever, sweating, and a foul, sweetish breath is very significant. The multiple, superficial abscesses will be observed in some cases. In others the signs and symptoms of metastatic abscesses will be present and evident by the cough, dyspnea, and localized condition of the lungs. There may be effusions in the pleuræ and pericardium, peritonitis, splenitis, albuminuria, hepatitis with jaundice, suppuration of the joints and various other conditions may develop.

The treatment, whenever practical, includes the removal or thorough drainage from the focus of infection. The general strength should be maintained by fresh air, nourishing food, and strong, stimulating tonics. In streptococcal infection an appropriate serum should be used. An autovaccine made from the focus of infection should be used. All sera in this condition should be used intravenously.

Emil Mayer.

Acute Vegetative Endocarditis With Multiple Secondary Foci of Involvement Due to *Micrococcus Pharyngitidis Siccæ*.

SCHULTZE, OSCAR T.

J. Am. M. Ass., Chicago, 1918—LXXI—1739.

A case of acute malignant vegetative mitral endocarditis in its clinical course and in its pathology simulated an endocarditis due to hemolytic streptococcus.

The causative organism was a gram negative diplococcus, which culturally was *M. pharyngitidis siccæ*, ordinarily a non-pathogenic inhabitant of the throat.

The organism was obtained in pure culture from the blood on two occasions before death, and from the heart valve vegetations after death.

The inception of the infection was probably an acute purulent bronchitis with bronchopneumonia.

Emil Mayer.

Demonstration of Diplococcus Meningitidis in the Adenoid Tissue of the Nasopharynx.

ARONSON, J. D., AND FRIEDBERG, S. A.

Med. Rec., N. Y., 1918—XCIV—1017.

The following summary is presented:

1. History of cases of meningitis in a community where Pvt. R. R. resided.
2. Sudden outbreak of meningitis in the organization to which he was attached.
3. Close association with four out of a total of six cases of meningitis in his organization.
4. Isolation of a pure culture of an organism showing the cultural, morphologic, tinctorial and serologic reactions of the regular type of meningococcus.
5. Sudden cessation of cases following his removal from the organization.
6. Demonstration of masses of bacteria in the adenoids removed from the nasopharynx showing the morphologic and tinctorial characteristics of the meningococcus.
7. Persistent negative cultures from the nose.
8. Persistent negative cultures from the nasopharynx following the healing of the operative wound.

CONCLUSIONS.

1. That the epidemic which made its appearance in the 110th Ammunition Train was due to a carrier, who was identified as Pvt. R. R.
2. That proper isolation methods being instituted, the epidemic was checked.
3. That the organism was harbored in the nasopharynx exclusively.
4. That the persistence of the carrier condition was due to the localization of the organism in the adenoid tissue.

5. That local medicinal remedies were effective in obtaining negative cultures only while they were being used, but had no value in the relief of the carrier state. On the contrary, their employment could very easily have led to a false conclusion which might have proved dangerous.

Emil Mayer.

Municipal Control of Diphtheria.

SCHAEFFER.

Laryngoscope, St. Louis, 1918—XXVIII—861.

Statistics show an increase of mortality from diphtheria, increasing each year since living conditions have become harder on account of the war. The city control of diphtheria means a persistent study of the causes of the disease, a prompt recognition of outbreaks, firm measures to prevent epidemics, close cooperation between family physician, health departments and strict attention paid to the policy of health administration.

J. A. Stucky.

The Teeth and Tonsils as Causative Factors in Arthritis.

HAMMOND, ROLAND.

Am. J. M. Sc., Phila., 1918—CLVI—541.

The relation of the teeth and tonsils to arthritis is at present a moot question. Billings and his followers point to the careful work of Rosenow and others on the bacteriology of arthritis and to the numerous cases of improvement and cure of arthritis following removal of diseased teeth and tonsils. They believe that this proves the accuracy of their contention that a focus of infection exists in the head in many of these cases. On the other hand, many trained pathologists and reputable clinicians have been unable to reproduce either the laboratory findings or the clinical results of the Chicago workers. Consequently they either reject the theory as a whole or accept it in a greatly modified form. It is probable that the pendulum has swung too far in the direction of the wholesale removal of teeth and tonsils. The truth will probably be found in a middle ground somewhere between these divergent theories.

There is undoubted improvement in numerous cases of arthritis following the removal of an abscessed tooth or a diseased tonsil or when a case of active pyorrhea has received proper treatment. On the contrary, many such cases are given similar careful treatment without affecting the progress of the joint condition in the slightest degree.

One reason for the failure to obtain successful results in arthritis by treatment of dental and tonsillar disease is that the cases have been selected without knowledge of the exact pathologic condition present in the organ in question. Many apical abscesses in which nature had effected a cure by walling off the disease have been treated by extraction of teeth. This has resulted not only in the loss of valuable teeth, but has at times been the cause of a dissemination of the infection to other parts of the body, with dire results.

In the same way the crypts in certain areas of a tonsil may overcome an existing infection. These crypts are perfectly harmless. A tonsil in which the crypts are sealed over by scar tissue, perhaps as the result of an incomplete tonsillectomy, may be a source of potent danger if the crypts contain an active focus of infection.

Success in treatment of these foci lies with the men who can distinguish the apical abscess and the diseased tonsil which are overcoming their infection by nature's methods. They must know by careful and special training when a tooth or a tonsil is an active agent of infection. Such knowledge must be supplemented by accurate interpretation of dental radiograms and skillful laboratory work. Trite as the saying is, cooperation in such endeavor is the keynote of success.

Another reason for failure to alleviate arthritic cases is due to the fact that the focus of infection lies in some other part of the body. It may be discovered by further careful search in the lungs, heart, kidneys, genitourinary or gastrointestinal tracts, ductless glands, the nervous system and elsewhere. A certain number of cases are due to syphilis and to tuberculosis. Unfortunately, in many cases it is never brought to light.

Many cases of arthritis are believed by thoughtful physicians to be due not to a localized collection of microorganisms but to an entirely different etiology. This class of cases is

supposed to result from some disturbance of the metabolism, probably chemical in nature, which produces joint changes not always to be distinguished from those caused by bacterial agency. They compose a fairly large share of the cases of chronic progressive arthritis seen in the daily routine of practice. A general flaccidity of tissues and relaxation of important organs accompanied by ptosis of the abdominal viscera often characterize these cases.

In acute arthritis the probability of producing a cure or improvement by the removal of a supposed focus in the teeth or tonsils is greater than in cases in the chronic stage. It is unreasonable to suppose that a restoration of function can be brought about in joints where extensive pathologic changes have taken place.

One very suggestive fact brought out in this investigation has been the marked improvement in the general health of the patients when diseased conditions of the teeth and tonsils have been properly treated. It oftentimes seems as if a millstone had been removed from their necks. This is noted very commonly, even when no change was apparent in the joint condition.

—Survey of Head Surgery.

Thrombophlebitis of the Cavernous Sinus, of Tonsillar Origin.

Got.

Rev. hebd. de laryngol., etc., Paris, 1917—XXXVIII—313.

In many instances thrombophlebitis of the cavernous sinus has been noted with specific osteitis of the sphenoid, erysipelas, abscess and furuncles of the face and mastoiditis, but as a complication of tonsillitis it is quite rare. Only two cases have been found in the literature by the writer, those of Lapersonne and Tollins. Both these cases resulted from phlegmonous tonsillitis. Got's case occurred in a soldier aged twenty-two years, who gave a history of cardiac and respiratory troubles following articular rheumatism. He was suddenly seized with a very painful left tonsillitis, with marked general symptoms. An abscess developed in the tonsil which opened spontaneously nine days after the onset. On the following day edema was manifest in the left parotid, jugular

and temporal regions, and on arriving at the hospital exophthalmus and stupor were also noted. The tonsil was opened widely and the throat was lavaged, but the edema increased. Chemosis of the left eye, albuminuria and delirium set in. Death occurred in fifteen days after the beginning of tonsillitis.

—Survey of Head Surgery.

Report on Vincent's Angina in U. S. A. General Hospital No. 18,
Waynesville, N. C.

DAVIS, CHAS. E.

Survey of Head Surgery, Washington, 1919—I—241.

1. The following is a report of cases of Vincent's angina occurring among the patients and detachment at this hospital.

2. The disease is diminishing in numbers. All patients arriving at this hospital are being examined for this condition, and it has been found that a number of men on entering here have shown the Vincent organism in decayed teeth. There is a question whether or not this organism is the etiologic factor in this angina, as it is usually found in decayed teeth in many cases not associated with sore throat.

3. Colonel Vaughn, recently here, was also of this opinion, and further report will be made of these examinations.

FROM THE NOSE AND THROAT CLINIC.

August 15, 1918. Attention of this clinic was called to a number of cases of sore throat occurring among the ambulant patients. It was found that several were cases of ordinary tonsillar infection, but five or six were of the ulcerative type. Bacteriologic examination showed the presence of Vincent's organisms in the latter cases. Investigation showed that these patients were buying milk outside the grounds and that this milk came from a dairy where sanitary conditions were deplorable. By order of the Sanitary Officer this source of milk was cut off and no further cases developed. Recovery from infection was uneventful, except several cases were admitted to the hospital wards.

Since September 16, 1918, this clinic has investigated twelve cases of mouth infections by bacteriologic examination; eight cases showed Vincent's organisms, and four cases showed a

capsulated diplococcus which has not as yet been identified. In this series there were no cases of the ulcerative anginal type, but several showed very aggravated gingivitis. In one case smears from tonsil and incisor teeth were negative, while a smear from an old root of a tooth showed very positive Vincent's organisms, indicating need for prophylactic dentistry.

Precautions are being taken to isolate these positive cases.

FROM THE DENTAL SURGEON.

1. Upon a routine examination of mouth conditions on this hospital a certain few cases that simulated pyorrhea alveolaris but were lacking in the usual excretion of pus were noticed.

2. Of these cases some had associate ulcerative condition of the throat and were referred by me to the nose and throat specialist for his consideration.

3. Of seven cases referred in this way five gave upon bacterial examination of smears taken an index of Vincent's angina. It is presumed this condition is what is now known as 'trench mouth.'

4. The cases are under treatment, and so far are responding well. Treatment by this department is established as follows:

(a) A thorough prophylactic cleansing of the mouth.

(b) Instruction given to the patient in the use of a rinsing solution which contains ipecac, peroxid and glycerine. Patient used the solution on his brush in cleansing his teeth and diluted with water as a mouth wash.

(c) The spraying of the mouth with a pure solution of peroxid, under about eight pounds' pressure, gives great comfort to the patient and is done preliminary and during the course of treatment.

FROM THE CHIEF OF LABORATORY SERVICE.

1. August 15, 1918. Smears from throat of patients taken suddenly sick showed a fusiform bacillus, and a spiral organism in association characteristic of those in connection with Vincent's angina.

2. Since that time fourteen other patients have had similar complaints, and smears made from either the tonsils or ulcers around teeth and various parts of the mouth.

3. The results are as follows: Nine showed the organism above described in considerable numbers. Two of these had in association and considerable number an encapsulated diplococcus. Five showed an encapsulated diplococcus as the predominating organism without the fusiform spirilla organism.

Clinical Notes on the Large Parotids of Soldiers in Service.

MATTEI, CH.

Presse méd., Paris, 1918—303.

The true mumps is not the most important of the group of enlarged parotids classed as mumps in evacuated soldiers. There is a very large number of constant, large parotids without involvement of the general condition of the body and with no clinical signs except enlargement of the parotid. The patients, who usually have been evacuated two or three times within a short period, present one or both parotids more or less prominent. They are hard to the touch and give distinct impression of lobulation. There is no adherence to the skin, and no infiltration of the periglandular tissue. No pain, no trismus. The oral mucous membrane and Steno's duct are little altered. The other salivary glands are normal. The condition remains stationary, no matter what the treatment is. The etiology of this hypertrophic cirrhosis of the parotids is unknown. It is more prevalent among the Hindoos and the Arabs, and usually in patients over thirty years. There have been no cases of orchitis.

—Survey of Head Surgery.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Bilateral Paralysis of Recurrent Nerves Caused by Syphilitic Strumitis.

KUZUME, G.

J. Japan. Oto-Rhino. and Laryng. Ass., Tokio, 1918—XXIV
—271.

After considering the causes of bilateral paralysis of the recurrent nerves, the writer reports a case of a female, age thirty-three years. The voice was husky at first, later dyspnea occurred. The thyroid gland was swollen for forty days,

a dull pain being present. Wassermann was strongly positive. Laryngoscopic examination revealed that both vocal cords were fixed in the median line, either on respiration or phonation. Increased dyspnea forced him to perform tracheotomy. Energetic antiluetic treatment was applied with improvement; the tracheal canula was withdrawn, and the thyroid gland diminished to previous size. After two months the patient discontinued treatments, but the total paralysis of the left recurrent nerve persisted, since the left vocal cord took on a cadaveric position.

T. Hoshino.

Clinical Investigation on the Sense of Smell.

IDA, M.

J. Jap. Oto-Rhino. and Laryng. Ass., Tokio, 1918—XXIII and XXIV.

After giving detailed history of the previous investigations concerning the methods of olfactometry, the writer endeavored to examine the sense of smell in many patients having various nose infectious and nervous diseases. For odorous substances he chose ether, borneol, geraniol, musk, guaiacol, valerianic acid, pyridin and skatol. Zwaardemaker's improved olfactometer was used.

In healthy men he confirmed the finding that the olfactory organ has a certain preliminary reaction to stimulus, and that the duration of the sense of smell differed in individuals and with the time of day. Recovery from fatigue of this sense is variable in healthy persons and the minimum time of recovery is from four to five minutes, with the olfactory material of definite concentration.

The main results given are as follows:

Fatigue of the smell sensation seems to be hastened in hyposmia. In old age, over sixty, no impairment in the sense of smell could be demonstrated.

In accessory nasal sinusitis, the disturbances of smell sensation are caused by changes in the end organ.

In ozena a diminution in the sense of smell could not be perceived, nor was the slow advent of fatigue constant; but recovery from fatigue is accelerated.

During convalescence after infectious diseases, such as typhoid fever and diphtheria, the sense of smell seems to be more acute. The same result is noted in Basedow's disease. The high temperature, as during fever, appears to disturb the function of the organ of smell.

In leprosy, hyposmia appeared in 50 per cent of the patients, although no apparent change was seen rhinoscopically. As a rule, the fatigue comes on slowly and the recovery, rapidly, on the contrary.

Tabes dorsalis in the cases observed, did not affect the smell.

Hyposmia caused by cocain is not preceded by hyperosmia, while in acute cocainism partial anosmia sometimes occurs.

Most of the cases of anosmia, namely, 71.4 per cent, were caused by chronic inflammation of the nasal mucosa, past or present.

The sensation for musk and skatol is first lost and that for ether and pyridin last, as anosmia progresses. The other odorous substances fall into places between these.

The nerve fibers which have specific nerve energies for the fourth and ninth groups of Zwaardemaker's odorous materials, seem more sensitive than the other fibers, and those of the first and eighth groups seem more resistant than the others.

He claims from his results that the olfactory nerve seems to be composed of fibers which show different reactions to certain odorous substances, and supports the doctrine of specific nerve energies in the olfactory nerve.

T. Hoshino.

Acromegaly of the Larynx.

JACKSON, CHEVALIER.

J. Am. M. Ass., Chicago, 1918—LXXI—1787.

Four cases are too few for final conclusions, but the following points seem important:

1. The larynx should be examined in every case of hypophyseal abnormality.
2. The overgrowth characteristic of acromegaly in some cases involves the laryngeal cartilages and soft parts.

3. Acromegalic changes in the larynx may produce stenosis sufficient to require tracheotomy to prevent asphyxia, dyspnea being added to by impairment of the glottic movements, resulting in a defective bechic cycle.

4. In three out of four cases, the laryngeal mucosa was normal. In one, the chronic laryngitis present was probably a coincidence.

5. In three of the four cases, the laryngeal image was not symmetrical, though the laryngeal enlargement seemed so by external palpation.

6. In all cases of apparent hyperplasia of the larynx, acromegalic overgrowth should be listed for diagnostic exclusion.

7. Laryngeal examination should be recorded as a routine in all cases of hypophyseal abnormality, for the accumulation of data.

8. Altered voice in acromegaly may be due to laryngeal changes as well as to alteration in the resonating cavities, lingual enlargement, etc.

Emil Mayer.

The Endobronchial Treatment of Bronchiectasis and Bronchial Abscess.

MAYER, EMIL.

N. York M. J., October 19, 1918.

The writer describes a method of treating hypersecretion in the bronchi by suction, by washing out the abscess and applying medication through the bronchoscopic tube. The apparatus employed was devised by Dr. Sidney Yankauer and consists of a double tube, the outer one to be attached to the suction apparatus on the left and the inner one to the irrigating apparatus on the right. The method of treatment is as follows: A hypodermic of half a grain of morphin with atrophin should be administered half an hour before treatment is begun, followed by thorough cocaineization, with cotton applicators, of mouth, tongue, pharynx and larynx, from ten to twenty per cent. The patient should lie on his back with his head supported by a trained assistant, the bronchoscopic tube inserted, and a spray of two per cent cocaine and adrenalin thrown into the bronchus to allay coughing. The excessive secretion in the bronchi is then withdrawn through the tube,

by the suction apparatus, and ten ounces of warm salt water slowly introduced through the inner tube is at once withdrawn through the outer one. This method is to be used in the first or second bronchoscopy. The patient, showing no intolerance to the introduction of the fluids, finally receives a solution of iodine and carbolic acid (iodine two drams, carbolic acid fifteen mm., to one pint of water) in place of the salt water. This method of treatment was repeated twice weekly in each case, with no serious results. As it may be necessary in some of these cases to continue treatment for years, and in view of the danger of developing drug habits through the repeated use of morphine and cocaine, the writer gives the treatment once instead of twice weekly. He has also drawn up a form of chart which shows the treatment given in each case, the number of patients treated each day, and the number who receive a given form of treatment. Dichloramin-T in the form of chlorazene tablets, beginning with a solution of one tablet in ten ounces of water, was given in a few selected cases, the bronchus being first washed out with the salt water. The cases reported have been under observation for three months; there has been almost complete cessation of odor, especially after the use of iodine, and a diminution in the amount secreted—at least, expectoration is very much easier. Moreover, a decided improvement has been noted in the physical condition of the patients. The writer adds that the report submitted is one of distinct progress, and he believes that the ability of the bronchi to withstand the introduction of quantities of fluid without harm has been demonstrated. This preliminary account of the work has been made in the hope that some other drug or method may be suggested that will prove even more efficient.

Emil Mayer.

Postoperative Care After Total Laryngectomy.

CANUYT, G.

Rev. hebdomadaire de laryngologie, etc., Paris, 1918—XXXIX—293.

From 1914 to 1918, sixteen laryngectomies have been done by Canuyt's chief, Prof. Moure, without a single death. This remarkable result has been attained by the operative technique, which rests upon three fundamentals:

1. Preliminary tracheotomy,
2. Local anesthesia,
3. Total laryngectomy from below upward, and upon the postoperative care, which latter constitutes fifty per cent.

Details of the postoperative care are given minutely and include the following: Usually the incision wound unites without much reddening. In the depths of the wound, however, a sphacelus may form in the esophageal or lateral pharyngeal walls. The surgeon should be on the lookout for this, especially from the sixth to the eighth day, and remove it.

In dressing the wound, layers of gauze are applied to the neck about the canula, and covered with a layer of waterproof material to protect the wound from the excretions through the tube. Additional gauze about the tube, laid over the waterproof dressing, serves to collect the excretions, and this should be changed frequently.

Lombard's canula should be used invariably and should be cleansed frequently. The room temperature should not be too high, not more than 16 or 18 degrees C., but the bed should be comfortably warm. The patient should be instructed to make no attempt whatever to speak and to avoid coughing or cleaning the throat as much as possible. Food should be given through the esophageal tube; the dietary is detailed.

—Survey of Head Surgery.

Experiments With a New and Most Efficient Remedy for Pulmonary and Laryngeal Tuberculosis.

TWEDDELL, F.

Med. Rec., N. Y., 1918—XCIV—1061.

Judging from his limited experience, the writer believes that sulphur dioxid will be of benefit in all cases of tuberculosis where the gas can come in contact with the diseased tissues, such as tuberculosis of the lungs, larynx, ear, and nose, also in a certain number of cases of pertussis. This treatment might be given a trial in streptococcic infections and bronchiectases.

The best treatment is obtained with a small tank of liquid sulphur dioxid. This tank contains about eight pounds of the

liquid and lasts about eight months. A rubber tube should be attached to the outlet and dipped into a glass test tube half full of water. The amount of the gas can thus be regulated.

To begin treatment, select a small room without any metal fittings, as the gas will corrode them. Close all windows and doors. Place the tank in any part of the room, turn on the gas so fast that the bubbles cannot be counted. Within a few minutes the patient will notice the odor of the gas and also taste it on his tongue. Now turn the gas down to about sixty to one hundred bubbles a minute, more or less. The patient should stand not less than six feet away from the tank and take deep inhalations, two or three times a minute, holding his breath at the end of each inhalation for not more than four or five seconds. Inhalations should be kept up for fifteen to twenty minutes at a time. Patients should breathe through the mouth only, except in cases of tuberculosis of the nasal cavities. When there is much sneezing, the nostrils should be closed with pieces of absorbent cotton. Coughing occasionally during treatment will do no harm. When there is much coughing, the gas is too strong; in that case turn it off and open the doors and windows for a few minutes and begin over again, using less gas. The gas is always too strong when it causes weeping or smarting of the eyes.

Inhalations should take place three or four times a day for incipient cases, and five or six times a day for severer ones.

When tanks cannot be obtained, the patient can burn a teaspoonful of sulphur on any metal dish by dropping a few drops of alcohol on the sulphur and lighting it. When too much gas is present, the flame can be put out, and when there is insufficient gas more sulphur can be burnt.

Patients with gastric and intestinal symptoms are much benefited by the administration of dilute sulphuric acid (U. S. P.) mx-xx in a glass of water t. i. d., one-half hour before meals. This causes increased frequency of micturition after a while and should then be stopped or the dose diminished.

Emil Mayer.

V.—MISCELLANEOUS.

The Remains of the Thyroglossal Duct in Japanese and Concerning the Cyst and Fistula Which Grow Therefrom.

AKAMATSU, J.

J. Jap. Oto-Rhino. and Laryng. Ass., Tokio, 1918—XXIV
—103.

The writer enters upon the investigation by studying anatomically 75 Japanese corpses; also clinically tumors and fistulæ which have grown from remnants. He concludes that:

1. The foramen cecum of the tongue was evident in 48 per cent, while in the remainder (52 per cent) it had totally or almost disappeared.

2. Thirty-one and three-tenths per cent of all cases had the residue of the thyroglossal duct, which compares approximately with the results of Weglowski on Europeans.

3. The remains of the thyroglossal duct always have connection with the body of the hyoid bone, being placed on it at the top, in front of it, or attached at its inferior border. Very rarely it is placed behind the bone.

4. The cysts at the root of the tongue, in the neighborhood of the hyoid bone, and the median cervical cysts or fistulæ, may develop from the thyroglossal duct or from its residues. They may, however, also grow from the mucous glands or accessory thyroids.

5. As Schlange suggested in the operation of these fistulæ or cysts, the reporter argues for removing a third of the body of the hyoid bone; at the same time extirpating the cyst or fistula.

T. Hoshino.

Uric Acid Metabolism in Asthma and Rhinitis.

DEKLEYN, A., AND VAN LEEUWEN, W. S.

Neder. Tijdschrift v. Geneesk., Amster., 1918—II—68.

De Kleyn and van Leeuwen confirm the statements of others in regard to the changes in uric acid metabolism just before, during and after an attack of asthma and attacks of vasomotor rhinitis. They tabulate the metabolic findings in

twelve cases on a purin free diet, and during and after a day on which 100 gm. each of meat and of kidney or sweetbreads had been ingested. In comparison with normal persons, the excretion of uric acid in the urine was of the same type as in gout. This suggested treatment on the same basis as for gout, reduction of the purins in the diet and antigout drugs. The effect was remarkable in some of the rhinitis cases, and some benefit was apparent in the asthma cases but less pronounced. The significance of the abnormal conditions in respect to elimination of uric acid in their cases of asthma and vasomotor rhinitis was enhanced by the frequent discovery of metabolic diseases in other members of the families, especially gout. They urge others to inform them of cases of vasomotor rhinitis, asthma, gout and hay fever in one family, specifying whether the diagnosis of gout is based on metabolic research or on the gouty big toe. The outlook is encouraging for great relief and improvement in vasomotor rhinitis under abstention from purins, with calcium chlorid according to indications, and possibly other antigout drugs. Acid drinks and dishes should be avoided as well as the purins.

J. Am. M. Ass., Chicago, 1918—LXXI—1702.

Phagocytic Experiments in Influenza.

TUNNICLIFF, RUTH.

J. Am. M. Ass., Chicago, 1918—LXXI—1733.

The writer presents the following conclusions:

1. Specific opsonins for the green producing streptococcus isolated from influenza patients developed during the course of the disease.

2. A specific decrease in opsonins for the organism occurs in the pneumonia following influenza. This lowered opsonic power persists unless the patient recovers, when it returns to or may rise considerably above normal.

The changes in opsonic power in influenza and influenzal pneumonia are specific for the green producing streptococcus, no fluctuations being observed with bacillus influenzae, micrococcus catarrhalis or streptococcus hemolyticus.

3. These experiments would indicate that the green pro-

ducing streptococcus is of some significance in influenza and the complicating pneumonia.

4. Accompanying the leukopenia of influenza occurs a non-specific decrease in the phagocytic activity of the leukocytes. This decreased activity continues unless the patient recovers, in which case the leukocytes become normally active with the increase in number.

5. It is suggested that the leukopenia and the diminution of the phagocytic activity of the leukocytes in influenza may account in some degree for the severity and frequency of secondary infections in this disease. It is possible that convalescent serum or immune horse serum may be of value in promoting leukocytosis and also in increasing the antibody content of the serum.

Emil Mayer.

The Epidemic of Influenza at Camp Sherman, Ohio.

FRIEDLANDER, ALFRED; MCCORD, CAREY P.; SLADEN, FRANK J., AND WHEELER, GEORGE W.

J. Am. M. Ass., Chicago, November 16, 1918.

In this epidemic of clinical influenza occurring in an army camp with a population of 33,044 soldiers, 10,979 men (33.22 per cent) contracted the disease. Secondary to the influenza there occurred a high incidence of pneumonia, affecting 2,001 (18.22 per cent).

The outstanding features of the epidemic were:

1. Of the camp's population (33,044), 15,493 (46.8 per cent) were men who had been inducted into service within the previous month. This group of men contributed 2,944 (69 per cent) of the first 4,269 cases occurring in the camp. That is, two-thirds of this group of cases occurred from a group of men comprising less than half the camp's population. The incidence of the disease decreased with the length of residence in camp.

2. The severity of the infection occasioned a high mortality. During the epidemic 842 deaths occurred, 7.66 per cent of the total number affected in the epidemic and 2.55 per cent of the camp's population. All deaths were attributable to acute inflammatory pulmonary edema or to pneumonia.

3. *Bacillus influenzae* (Pfeiffer) has not been demonstrated

as the causative organism. The frequency of its detection has not exceeded the frequency of its existence under normal conditions.

4. Pneumococcus, chiefly Type IV, has been the predominating organism. From the sputum the pneumococcus has been recovered uniformly. In necropsies the pneumococcus was detected in 53 per cent of instances. The hemolytic streptococcus occurred in 47 per cent of thoracic exudates.

5. The clinical manifestations necessitate a division into four types, which represent a progression in severity. Type I, characterized by coryza and bronchitis, was the forerunner of the true influenza (Type II). Type III comprised a group with subjective signs without demonstrable objective evidences of pneumonia. Type IV, acute inflammatory pulmonary edema, represented the most fulminant type of respiratory influenza.

6. The intense asthenia produced by the influenza influenced both the picture and the outcome of the secondary bronchopneumonia.

Emil Mayer.

The Dangers of Inhaled Dust.

EDITORIAL NOTE.

J. Am. M. Ass., Chicago, 1919—LXXII—729.

Specifically formulated, the question may be thus presented: Since it may be regarded as established that all forms of dust enter the lungs, why is it that some, such as coal, are relatively harmless, while others, such as flint, are deadly?

The answer appears to lie in the fact that some dusts are eliminated much more readily than others: at any rate, when the exposure is a moderate one. After intense dusting, all the dusts appear to produce much the same effects, both immediate and remote. But under the more usual industrial conditions, it seems from investigations, that dusts which make mischief are dusts that accumulate. Coal and shale, for example, are taken up by cells which are quickly shed and consequently do not set up processes which block lymphatics. These cells frequently break down, and masses of dust are to be seen on the surface of the alveolar walls. Plugs of mucus, dust cells and dust find their way out of the lungs through

the bronchi, though some dust may leave indirectly by means of the lymphatics. In other words, the more readily eliminated dusts produce a marked initial reaction with much shedding of epithelium. The flint dust and crystalline silica, by way of contrast, are taken up by cells that tend to remain in situ. They form plaques which persist, and the shedding of the epithelium is far less conspicuous. Cell proliferation is much more marked, and fibrosis may ensue. Permanent lesions are liable to be produced.

Since many persons are engaged in essential employments that compel them to pass a large portion of their time in dusty atmospheres, the question of ameliorating the conditions and averting the dangers is a serious one. Even if dust rarely kills, aside from producing considerable fibrosis of the lung it may predispose the individual to pulmonary tuberculosis. Dilution of the dust seems, by itself, to offer little promise of help in the case of the more dangerous sorts; for the dose must be extremely small in the case of such particles as flue dust and silica, if accumulation is to be avoided in the lung. There is somewhat greater prospect of relief in the observation that dusts which produce an initial reaction of epithelium shedding tend to carry the more inert forms out with them. Thus some admixture of coal dust may act as a protector when the more deadly dusts are inhaled; in fact, such chance combinations may explain the apparent immunity experienced by certain workers with flint and silica dusts. Coal dust has its special industrial risks, since it is responsible for explosions in the coal mines. This danger can be reduced to a minimum by mixing coal with inert dusts. Hence the ideal would be to stop colliery explosions by adding flint and to stop phthisis by adding coal, thus holding a tenace over providence.

Emil Mayer.

D. Cotugno, 1736-1822.

GRADENIGO, G.

Rif. Med., Naples, 1918—XXXIV—671.

Gradenigo quotes from the great Italian work of D. Cotugno, 1761, to show that the latter was the pioneer in the anatomy and physiology of the internal ear. Time has confirmed the

correctness of his statements, but Helmholtz published the same thing in 1862 as the results of his own original research, with no reference to Cotugno. Gradenigo suggests that it might be to the advantage of other nations, as well as Italy, to begin to take an inventory of their scientific patrimony, instead of continuing to accept at its face value the frequently recurring "Made in Germany" stamp.

J. Am. M. Ass., Chicago, 1918—LXXI—1701.

Esophageal Diverticulum, With Report of a Case.

HENDON, GEORGE A.

Am. J. Surg., N. Y., March, 1919.

The first manifestations noted are: Dryness of the fauces with a sensation similar to that induced by the presence of a foreign body in the throat. The patient complains of dysphagia, and nausea with regurgitation of undigested food particles finally supervenes. When the diverticular sac attains sufficient proportions a palpable fluctuating tumor is noted beneath the angle of the jaw. The left side is more frequently involved than the right, but no reason can be assigned for the disproportion. For obvious reasons the clinical diagnosis may present some difficulty, but accuracy can usually be assured by careful anamnestic and clinical investigation. Confirmatory evidence is afforded by roentgenographic and esophagoscopic procedures.

The treatment of esophageal diverticula is essentially surgical, and if the diagnosis has been correctly made, gastrostomy as a preliminary measure should not be performed unless the patient is in imminent danger of starvation and rectal alimentation is found impossible or is deemed inadequate. The inevitable desideratum is obliteration of the diverticular sac, and various methods have been devised by which this may be successfully accomplished. The most satisfactory procedure is believed to be excision of redundant portions of the sac with closure of the remaining opening by suture and inversion according to the plan pursued in the case reported.

The two-stage operation is also recommended by Mayo where the diverticulum has attained considerable proportions, and Murphy advocated this method of procedure in all cases.

Mayo first dissects the sac free, leaving the neck attached; the sac is not opened during the first stage, but left outside the neck in the dressing; the skin edges are sutured to the esophagus at its juncture with the diverticulum. After ten or twelve days adhesions have formed about the sac, when it may be excised without an anesthetic and the edges inverted into the esophagus. This operation is not difficult and is perfectly safe from any possibility of infection and has been very satisfactory in our cases in which the sac was fairly large. The infolding operation in the case of small diverticula seem to be very satisfactory and a safe method of procedure in all cases of diverticula of the esophagus.

Mosher recently devised a new method of treatment, viz., dividing the common wall between the diverticulum and the esophagus. The primary step is to locate the opening of the pouch and also that of the esophagus, which is best accomplished under ether with a "ballooning" esophagoscope. Then with scissors the wall is divided to within one-eighth of an inch of the bottom, this small rim being left to avoid opening the mediastinum. There is but slight bleeding, the field being kept clear by suction. The patient is nourished by rectum for two days; bougies are passed at the end of a week. The ultimate fate of the sac after cutting its wall has not yet been determined, but the outcome in three cases lead the author to conclude that the procedure is easily accomplished, is probably safe, and results in a clinical cure. Emil Mayer.

Cancer of the Thyroid Gland.

BALFOUR, D. C.

Med. Rec., N. Y., 1918—XCIV—846.

A study of these results in the series of cases and of the individual cases gives us valuable information as to what can be accomplished in the surgical treatment of cancer of the thyroid:

1. The most important lesson is presented in the fact that in 46 per cent of the cases of cancer of the thyroid, no clinical manifestations of the disease were in evidence. This group shows by far the highest percentage (about 70) of patients free from recurrence at the present time. In other

words, the great majority of apparent cures have occurred in those cases in which the malignant change was an unexpected finding. Total thyroidectomy was rarely performed in this group. In most instances the lobe containing the tumor and the malignant process was removed, but in many the enucleation of an adenoma was the procedure.

2. In any nodular goiter suddenly exhibiting an increased rapidity of growth, immediate surgical treatment should be urged.

3. When clinical evidences of cancer are present the results of surgical treatment are discouraging. Total extirpation of the gland appears to be indicated only when both lobes are grossly involved in the disease, and when past experience warrants surgical interference in the particular case.

4. Recognizable involvement of cervical glands usually means that the time for surgical cure is past. Occasionally, however, just as the unexpected occurs in the treatment of extensive cancer elsewhere, an apparent cure is obtained. In 1913 the writer removed from a patient (Case 81854) the right lobe of the thyroid containing a malignant adenoma. A mass of glands in the submaxillary region was also proved to be carcinomatous. A week later a block dissection was done. The patient is now alive and well, with no evidence whatever of recurrence. Such cases are, however, notable exceptions to the rule.

5. Gross involvement of trachea or esophagus is almost a certain sign against curability, and yet one may be tempted into an extensive and dangerous operation to remove the diseased tissue because of the knowledge of an unexpected result in the past. A patient (Case 73753) was operated on (by E. S. Judd in 1912) for a malignancy of the left lobe which was found to involve the lateral walls of both trachea and esophagus. The involved areas were both excised, with primary closure, and although bougies were required later to maintain the caliber of the esophagus, the patient is now, six years after operation, in perfect health and has no local disability.

6. The last and most important lesson learned from the standpoint of prophylaxis is the fact that in this series the average number of years of abnormal growth in the thyroid

preceding the operation was 11.6. This is proof positive of the advisability of the early removal of well developed thyroid nodules, and it is a regrettable fact that not infrequently we meet with cases of hopeless thyroid cancers in which a tumor has been present for many years, but the patient had been able to secure the advice of "leave it alone; it will never bother you."

Finally, the treatment of cancer of the thyroid should be that of the treatment of precancerous lesions elsewhere—that is, prompt surgical treatment of the precancerous condition in the thyroid—the adenoma.

Emil Mayer.

Tuberculosis of the Thyroid.

GIACINTO, G.

Policlin., Roma, 1918—XXV—Surgical Section No. 8—225.

Giacinto reports the case of a nun, forty-two years old, who for eight months had noticed that the right lobe of the thyroid gland was enlarging. Irregular neuralgic pains were also felt in the tumor, irradiating downward and outward or upward. These pains were variable, appearing usually in the evening, and were not modified by the ordinary sedatives. The temperature rose slightly toward evening. The hard tumor was tender, with irregular surface, and immovable except for slight movement during swallowing. There was slight emotional tachycardia, but no signs of exophthalmic goiter. The urine was normal. The weight had dropped over fifteen pounds in two months. The diagnosis wavered between malignant goiter and woody thyroiditis, but an exploratory incision showed the capsule much thickened and bound down to adjacent tissues. A wedge was excised, five centimeters long by three centimeters wide; the inner end seemed to be normal tissue, but a cheesy tubercle was apparent above. No tubercle bacilli could be discovered. Treatment was by daily injection of alternating iodine and arsenic. Then two weeks after the exploratory operation, when the wound was covered with granulations, the thyroid was exposed to the roentgen rays. Six exposures were made of ten minutes each in the course of six weeks. By the fourth exposure the pains were less, and the thyroid began to subside. Each exposure was followed by

malaise and general prostration, which was thrown off in twenty-four hours. In two months the wound was almost completely healed but the evening rise in temperature persisted a while longer. By the fifth month the patient had gained twenty-two pounds in weight, the complexion was good, there had been no pains for two months and the thyroid had returned to normal size and consistency except for slight hardness of the upper pole of the right lobe. The clinical recovery has persisted unmodified to date. No trace of tuberculosis elsewhere had been found at any time except a few small hard, movable and indolent glands in the right supraclavicular region, which were apparently not influenced by the treatment. Giacinto has found nine operative cases of tuberculous strumitis on record with an abscess; two terminated fatally and in one a fistula persisted. In nine cases of ligneous tuberculous thyroiditis, three of the patients succumbed soon to complications, or to thyreopriva cachexia. The operation was done in these nine cases on assumption of cancer. The roentgen rays demonstrated a curative action also on an extensive tuberculous lesion on the tongue in a case reported by Stropeni in 1913. Gebele has published a case in which, after resection of part of the thyroid, the remainder was treated by roentgen exposures, and permanent clinical recovery followed. The retrospective diagnosis was tuberculosis.

J. Am. M. Ass., Chicago, 1918—LXXI—1700.

The Problem of Stammering.

KENYON, ELMER L.

Laryngoscope, St. Louis, 1918—XXVIII—666.

The writer defines stammering as a serious disorder shown by emotional disturbance with a spasmodic, abnormal action of the peripheral organs of speech. Present intelligent means for treatment are not yet adequate. On account of the limited knowledge of the subject, laymen or medical men cannot be depended on to solve the problem, and it can be solved only through specially trained, educated physicians. Provision should be made for such education in large medical centers. There must be a system of prophylaxis developed and applied to the work in public schools.

Treatment rests on educated self-control, with application directed toward conscious control of peripheral speech mechanism, direct control of emotional and nervous disturbance. The treatment varies with the individual case, success being difficult and slow.

The deceptive stammering schools should be published through the organized medical profession as patent medicines have been.

J. A. Stucky.

Consideration of Asthma From Wider Aspect.

POLLACK, H. L.

Laryngoscope, St. Louis, 1918—XXVIII—543.

The vast quantity of literature on asthma is due perhaps to lack of definite etiology; each writer has theories and arguments to sustain his hypothesis. After studying many cases and lines of treatment, the writer concludes: The underlying cause of asthma is a disharmony in the ductless gland system; the exciting factors vary, but asthma cannot result without a disharmony. The writer found good results from the treatment outlined in this paper. The ductless system must have more thorough study before attempting permanent cure. All clinicians can do is to examine cases carefully and to treat on a rational though empiric basis. Reports must be made enthusiastically but truthfully.

J. A. Stucky.

The Training of Speech Instructors.

SWIFT, W. B.

Laryngoscope, St. Louis, 1918—XXVIII—869.

Answers to inquirers desiring to enter this field of work are determined by plans of the inquirer, whether he wishes to do corrective work in public schools or to become a speech expert. Grade school teachers can begin the work with very little expense or study; but those preparing to teach teachers must study the entire subject of related arts and sciences. The field of speech correction may be divided into three subjects: Stuttering, phonetics, and treatment of mental defectives. By attending lectures and clinics one can get both theory and practice. Teachers must have didactic instruction, expert

application and actual experience in applying those instructions. The subject is mastered by practice rather than theory. To a person desiring to study this practical, interesting work, there is no limit to the range.

J. A. Stucky.

Motor Aphasia From Concussion.

LERI, A.

Bull. Soc. méd. de hôp. de Paris, 1917—LXI—1314.

An explosive shell burst in the neighborhood of an officer forty-five years of age who was neither wounded nor lost consciousness, but at once had a complete anarthria and agraphia. He retained his full vocabulary and was almost as bright as normally, but his memory of occurrences of the past was profoundly altered. Later on the patient had an attack of Jacksonian epilepsy in the right arm. The condition was probably one of concussion hemorrhage and an anarthria and agraphia remaining complete for a month during Leri's observation.

The Epidemiology of the Sputum-borne Diseases and Its Relation to the Health of the National Forces. (The Wellcome First Prize Essay, 1918.)

VEDDER, E. B.

Mil. Surg., 1919—XLIV—123.

Epidemic diseases in the armies of the past and present show a marked contrast. A century ago the deficiency diseases, such as scurvy, predominated. A few years ago intestinal diseases were the greatest cause of illness in our armies. In the present war, Vedder is tempted to say, for practical purposes military medicine comprises only three chapters: First, the sputum-borne diseases; second, the venereal diseases; third, the insect-borne diseases.

He admits that this sweeping statement is not strictly true, but it serves to focus attention upon essentials. What are the sputum-borne diseases? We may say that they include tuberculosis, pneumonia, influenza, tonsillitis, bronchitis, measles, mumps, scarlet fever, whooping cough, diphtheria, cerebrospinal meningitis and the sequelæ of these diseases. Their tremendous incidence in the army of today is shown by the tabulated statistics of Col. A. G. Love comparing them

with the venereal diseases in 1916 and 1917. From them Vedder draws the following conclusions:

(1) In both tables, influenza, bronchitis and tonsillitis are responsible for the highest rates, both admission and non-effective. (2) Before the war measles was a relatively unimportant factor. In 1917 it caused more admissions than any other disease except gonorrhea, bronchitis and tonsillitis. (3) Scarlet fever and diphtheria are relatively unimportant causes of admission in both. (4) Cerebrospinal meningitis is of still less importance so far as admissions and noneffective rates are concerned. If it were not for the high death rate of this disease and the terror that it inspires it would cause little or no concern to the military sanitarian. (5) Whooping cough is practically nonexistent. (6) The admission, death rate, rate of discharge and noneffective rates are all higher for the sputum-borne diseases than are the corresponding rates for the venereal diseases. Averaging both years, the admission rate for the sputum-borne diseases was approximately two and one-half times higher than the admission rate for venereal diseases. The deaths from the sputum-borne diseases are approximately forty-five times more numerous than the deaths from venereal diseases. (In this connection it should be noted that while the mortality from the venereal diseases, particularly syphilis, is very high, it does not commence until after the fortieth year, and therefore makes very little impression on the sick report of armies, where the men are all young.)

It may also be noted that although the admission rates for influenza, tonsillitis and bronchitis were all lower in the National Army than the corresponding rates for the Regular Army, this relationship is reversed in the case of measles, the rate for the National Army being 89.52, as against 57.12 for the Regular Army. Vedder thinks the cause for this disparity lies in the fact that there is more susceptible material for measles in the South and West, where the incidence of measles was especially high, than in the North. In the thickly settled North, measles is a children's disease and the Northern troops were generally immune.

Tuberculosis.—While it may be assumed that the great majority of recruits have been infected with tuberculosis, only

a small fraction have the disease in active form. Bushnell found that somewhat less than 1 per cent of actual cases have been detected. Cases should be separated from their command for their own sakes, for the protection of others and because of economic reasons, since it is claimed by Bushnell that each tuberculous soldier returning from Europe will cost the Government five times as much as a nontuberculous soldier.

Lobar Pneumonia.—The death rate for lobar pneumonia is higher than that of any other disease except measles, and it is truly the "captain of the men of death." In the great majority of cases the pneumococcus is the etiologic factor. Dochez and Avery have shown that there are four types of pneumococcus and these have a mortality varying from 16 to 25 per cent. Lobar pneumonia is conveyed by the sputum of convalescents and carriers. While exposure to wet and cold predispose to the disease, epidemics have occurred in the tropics as a result of overcrowding, etc. Treatment by sera has been disappointing, but the sera that have been developed are effective only against Type I, to which only a third of the cases belong. Protective inoculation offers some hope, and emphasis should be placed on sanitary rather than curative measures.

Bronchopneumonia.—In a considerable proportion of cases the pneumococcus is responsible, though the influenza bacillus, Friedlander's bacillus or a streptococcus may be the infecting organism. Incidence and mortality are not high. Vedder distinguishes between primary bronchopneumonia and that which appears as a sequel of measles and is very serious.

Influenza.—True influenza is caused by the *B. influenzae*. (This paper was written before the great epidemic which began in September, 1918.) The organism is easily killed by heat or drying, and the disease is probably spread entirely by direct transference of sputum or nasal discharge. Many of the cases carried on the sick report as influenza were probably common colds, of which recent investigations have indicated a filterable virus to be the cause.

Tonsillitis.—This has been one of the most frequent causes of admission and is a more serious condition than the death rate indicates, since many systemic infections are acquired through the portal of the tonsils. *Staphylococcus aureus* and

the streptococci are the commonest causes. Transfer of saliva through close contact is the usual method of infection, but the pyogenic cocci are resistant in the dried state and may live for months, so it is possible that the disease may be contracted from dust containing dried sputum.

Measles.—The rate of admission for this disease has been high, particularly in the Southern and Western camps, and the mortality from pneumonia following has been higher than that from any other disease. A filterable virus is probably the infecting organism. Experiments on monkeys indicate that the virus is present in the buccal and nasal secretions. While the incubation period is commonly given as from seven to fourteen days, Munson states that in the epidemic on the border it was practically always fourteen days. Like most of the other sputum-borne diseases, it is a cold weather disease, hence when cold weather approaches, the organization surgeon should be on the lookout for cases. He should determine which men have had measles and which have not. Cases of coryza or bronchitis among the nonimmune should be isolated in small groups; three or four days will determine whether the disease is measles. Nonimmune contacts with suspicious cases should be isolated separately for fourteen days.

Measles Pneumonia.—This may be lobar and due to pneumococci, but is more often lobular and due to hemolytic streptococci. Of 291 measles patients, 104 were found to have hemolytic streptococci in their throats, and 33 per cent of the 104 developed pneumonia. Cold and fatigue are predisposing factors of importance. Prevention of infection in hospitals depends largely upon keeping patients warm in bed and preventing transfer of infectious sputum by masks and screens, and at least some modification of the cubicle system.

Mumps.—As the admission rate is low, the disease is of importance chiefly because it requires a long period of hospitalization. The organism is unknown, but is probably a filterable virus in the saliva. It has been stated that mumps may remain infectious for six weeks, but when the infection has been bilateral from the start the period of isolation might be reduced to three weeks. The incubation period is from two to three weeks, so that contacts who are isolated must

be observed for three weeks. Immediate conveyance of saliva by means of soiled fingers, drinking cups, pencils and eating utensils probably is the chief manner of transmission.

Scarlet Fever.—This is relatively unimportant in the military service because the cases are generally sporadic. The organism is unknown, but secretions from the nose and throat are probably the only source of infection. No one knows how long scarlet fever is infectious, but four weeks have generally been accepted as a safe minimum. Prevention of its spread will depend mainly on general measures to prevent the interchange of sputum and saliva.

Whooping Cough.—This disease is practically nonexistent in the army and needs little discussion. A small bacillus isolated by Bordet and Gengou in 1900 is the infecting organism. It is present in the sputum, and is probably most infectious in the early or catarrhal stage.

Diphtheria.—This also is of relatively small importance in the army. The Klebs-Loeffler bacillus is transmitted to the healthy by the nasal or buccal secretions, and the spread of diphtheria is mainly due to contact with carriers or mild missed cases. When a case occurs, nose and throat cultures should be made of all men in the organization and they should also be given the Schick test. Treatment of carriers is generally unsatisfactory. Some methods, by irritating the throat, rather prolong the period of isolation. A mild antiseptic spray and gargle, such as Dobell's, is probably as effective as any of the heroic treatments.

Cerebrospinal Meningitis.—Anxiety over this disease is out of proportion to its rate of incidence; it inspires terror solely by reason of its high mortality. Though spoken of sometimes as being epidemic, it is in reality only sporadic and apparently few individuals are susceptible. It is probable that the disease should not be regarded as a meningitis but as an infectious rhinopharyngitis in which the meninges become involved in 10 to 20 per cent of the cases. Methods of control have hinged on the detection and control of the carrier. Detection involves a complicated laboratory technic, and treatment of the detected carriers is unsatisfactory, especially in chronic carriers. Limiting the distribution of infectious secretions, keeping the soldier warm and avoiding fatigue are

practicable and probably just as efficient as a strenuous campaign against carriers.

General Measures That May Be Taken to Prevent Sputum-Borne Diseases.—Overcrowding in barracks favors infection. In the present cantonments each soldier is allotted forty-five square feet of floor space; he should have at least sixty. With cramped quarters, sleeping alternately head to foot, with paper screens between the beds will constitute practicable measures of prevention.

The soldier should be educated as to the danger from sputum and nasal discharges. Speaking of a camp which he visited, Vedder says: "As one rode down the street, soldiers could be seen blowing their noses to right and left with a heroic disregard for the consequences, and if you addressed a soldier it was ten to one he would spit before he answered." Spitting should be prohibited by order. The common drinking cup should be abolished. Short talks in plain English might be given by company officers; it might be well to give a printed circular to every man.

Exposure to cold should be prevented. The soldier is often cold. He should be warmly clad and have plenty of blankets. Fresh air undoubtedly is good, but heat should not be sacrificed for ventilation; common sense is as important as sanitation.

The methods of heating in general use—stoves and steam—cause excessive dryness of the air. Water is abstracted from the respiratory passages, leaving them dry and prepared for bacterial infection. A pan of water on the radiator, or a trough with a cloth one end of which is dipped in the water, will moisten the air.

Undue fatigue of the soldier should be avoided; it does not strengthen but weakens him and leaves him a ready victim to infection.

Isolation of the infected is the first thought; to be of any value it must be applied when the first cases appear. If common colds were isolated in the early fall, many other diseases might be reduced. Isolated cases in hospitals should wear masks when out of their cubicles, and attendants should be masked. It is advisable to isolate new arrivals to camp for a reasonable period of observation.

Vaccination must be considered. In the case of pneumonia (lobar?) the procedure gives hopes of success. It does not appear probable that vaccination against streptococci would be successful; streptococci are varied, and a streptococcus infection itself does not confer immunity. Meningococcus vaccines have been prepared, but it will be difficult to determine their efficacy, for meningitis is only sporadic and occasional.

A. Miller.

Facial Autoplasty.

OMBREDANNE, M. L.

Bull. et mém. soc. de chir. de Paris, 1918—XLIV—592.

During the three years in which Ombredanne has been in military service more cases have been referred to him for autoplasmic treatment than his master Nelaton had the opportunity to observe during his whole career; all these cases have been successfully dealt with by following the principles established in their collaborative work published before the war.

A general anesthetic is considered necessary to the secondary prosthetic operation; ether is used when the repair is to be made upon the upper portion of the face; chloroform is insufficient if the lesion affects the lips, mouth or chin. By these two processes, tubage or the intercricothyroid method is avoided.

Operation for the repair of the face, the author insists, should be undertaken only when the plan of the incisions which limit the autoplasmic flap has been exactly fixed by means of designs made in colored anilin crayons upon the wounded man's face; the size and manner of displacement of the flap can be definitely worked out in paper and taffeta. It is a confession of poor workmanship if the plan of operation must be modified at the time of operation.

Under the heading, "Reinforced Flaps," Ombredanne speaks of the good results which have followed his use of costal cartilage, especially in the repair of mutilated or destroyed noses. He cites the case of a man whose septum had been torn away by a splinter of howitzer which passed out at the bridge of the nose; the nose was tightly drawn down upon the upper lip and the nasal orifices were absolutely impermeable. The oper-

ator placed a piece of cartilage under the groove of the upper lip beneath the nose, and after the necessary length of time had passed, a flap adhering to the nose, composed of the whole subnasal groove and the cartilaginous plate beneath was turned back to make a very satisfactory nose; the upper lip was repaired simply by drawing it together.

Ombredanne emphasized the prime importance of the lining flap in the repair of the nose, of the eyelid, of the cheeks, and of the palatal arch; the lining flap is of much greater importance than the cover flap, he says. In restoring the wall of a nostril, for instance, if the raw side of the flap is turned outwards the tendency to atresia is avoided. The lining flap gives the posterior prominence to the wall of the nose: the cover flap merely serves as an epidermal layer. During a detail operation the pedicle of the cover flap is cut while the lining flap holds firm. In the repair of the eye a good facial lining flap may prevent the process of cicatrization from effacing the palpebral cul-de-sac. In closing defects of the cheek the skin of the lining flap is turned toward the mouth. In the repair of the palatal arch the method described by Morestin is followed in its broadest outlines. Compressors are used to hold the unsteady and lining flaps in place and prevent their shrinking into a ball. The lining is everything, the cover nothing, says Ombredanne, to impress us with its importance.

In removing depressed scars, Ombredanne employs the mattress pad of Moure, but when that cannot be used, he cuts and loosens the healthy skin at the edges of the cicatricial line; the bit of skin adhering to the bottom of the wound is very carefully removed and the scar tissue excised so that the fibrous crest appears more prominent than the surrounding tissue. By inserting the skin sutures obliquely about 1 centimeter from the edge of the wound, the skin over the fibrous mass beneath is forced up.

As an example of Ombredanne's method of creating cutaneous grooves and wrinkles, he cites the repair of the inner angle of the eye and of the groove which separates the lower lip from the chin. At the point where he wishes to create the groove he incises very lightly in all directions and cuts the skin very obliquely to $1\frac{1}{2}$ centimeters from each side. Then

he cuts beneath the conjunctival mass in such a way as to leave it adherent to the lowest point by a narrow strip. By means of mattress sutures the skin is brought to the depth of the lateral groove; after twelve days the major portion of the conjunctival mass is cut away. Next the pedicle of the mass is destroyed with a silver nitrate stick; the skin in remaining adherent to the bottom of the depression forms the desired groove.

As tin has been found to be more tolerant of the mucous tissues than silver or vulcanite, Ombredanne now uses it practically exclusively for prosthetic apparatus to maintain the natural orifices of the face. Tin shields have been designed to keep reduced the intrabuccal frena which have been sectioned; nasal tubes of tin have been supplied with grooves to keep them in place, and with openings upon their dorsal faces to add to the facility with which the wounded man breathes; masses of tin inserted into the conjunctival cavity maintain the exact contour of the glass eye.

—Survey of Head Surgery.

Wounds of the Large Vessels of the Neck.

MOCQUOT, PIERRE.

Rev. de chir., Paris, 1917—LIII—441.

An injury to one of these vessels may show itself externally by only a small hemorrhage, so that injured soldiers have been sent back to the evacuation hospital without the gravity of the lesion being suspected. Sometimes there is a hematoma, but these cases have always been due to wound of the artery. Occasionally, there is a short circuit of the blood between vein and artery, giving symptoms of an arterio-venous aneurism.

Diagnosis.—When this pseudoaneurism is not present, the diagnosis may be very difficult, especially if there has been only a small wound of the artery, which has become plugged by a clot, and if the blood current has not been obstructed. The presence of a hematoma suggests the diagnosis of a vascular wound, but gives no idea of its importance. Even a pulsation of this does not tell whether it belongs to the hematoma or is simply transmitted. Even when diagnosed, the location of the lesion, especially at the lower part of the neck, is difficult.

Anatomy and Pathologic Physiology.—In all cases seen by the author the injury was due to a shell, and the point of entrance was almost always along the sternomastoid. Usually, the fragment lodged in the region of the vertebral column. Once it passed completely through the neck. In one case there was a fragment in the internal jugular vein, another in the prevertebral muscle, and a third in the sternocleidomastoid. The fragment was usually very small. All cases were tangential wounds or perforation by small fragments.

In the jugular the injury ranged from a small lateral wound to almost complete section of the vessel. In the carotid the variation was not so great. A complete section of the inferior thyroid was seen in one case and of the vertebral in another.

The blood current is not interrupted in the injured artery in small lateral wounds, plugged by a clot, or where the surrounding tissues prevent the wound from gaping, and where the wound is clean cut and longitudinal. This is also true of the veins.

An arteriovenous short circuit following rapidly on the injury is frequent. It is caused by the simultaneous wounding of an artery and vein in direct or almost direct contact. Delayed short circuits are probably due to the subsequent absorption of the blood clots which closed the wounds.

Prognosis and Indications for Operation.—If there is a severe hemorrhage or if the hematoma seriously compresses the larynx or trachea, an immediate operation is necessary. It is very doubtful whether surgical intervention should take place in every case of wound of the cervical vessels, especially where the patient seems to be doing well without it, and the patient can be kept under observation. A case with hematoma was spontaneously cured.

The great danger is infection, followed by a secondary hemorrhage, especially where the wound communicates with the mouth or pharynx. A thrombus also may be the result of the infection, in turn causing embolus or obliteration of the vessel.

In suspected arteriovenous aneurisms, or when known, but not giving grave trouble, it is best to use the expectant treatment. The results of operation after the aneurism is established are as good if not better than for the primary condition.

The treatment is by ligation of the carotid. Where trouble arises following either the immediate or the delayed operation it is probably due to the acute suppression of the arterial circulation, without sufficient blood coming from the anastomosing vessels.

Where the projectile is large or in the neighborhood of a blood vessel, an immediate operation is best, but when it is small and not near a vessel, it is better to wait and see if it will be necessary.

On the other hand ligation of the internal jugular is a comparatively benign operation, although death may follow this operation also.

Operative Technic.—Oblique incision along the anterior margin of the sternocleidomastoid muscle. The direct anatomic path to the vessel is followed, irrespective of the track of the projectile. Where the carotid is involved a rubber tube of three-fourths of a millimeter in diameter is passed under it for the purpose of hemostasis if necessary. The sheath is incised, and approach to the vessel is almost always followed by a hemorrhage, usually from the internal jugular. Pressing upon the vein with the index finger allows localization of the bleeding spot, which can then be clamped or tied. If the rubber tube does not check the hemorrhage from the carotid, the same procedure can be followed. Some lateral wounds of the arteries can be closed by sutures, and this is far better than ligation. The latter is sufficient in venous wounds.

—Survey of Head Surgery.

The Occlusion of the Palatine Opening After Resection of the Upper Jaw.

MORESTIN, M. H.

Bull. et mém. Soc. de chir. de Paris, 1918—XLIV—1002.

The reparative operations upon war wounds which persist as large openings between the nasal fossa and the mouth have been suggestive of valuable methods in closing the palatine opening which follows excision of an extensive tumor of the upper jaw. As Morestin believes that it is practically always possible to close off the nasal fossa from the mouth, he ad-

vises occlusion of the palatine opening as a necessary complement to resection of the upper jaw. If for various reasons this cannot be undertaken immediately after the primary operation, a second autoplasmic operation is usually indicated and possible.

Although the palatine opening which is the result of an operation may be surprisingly reduced in the course of spontaneous cicatrization, in one case which Morestin reports the opening measured as much as 3 to 5 centimeters from front to back and 2 to 4 centimeters across. Morestin divides the plastic operation which he performs in the cases referred to him a few months after the primary operation into four stages: (1) The refreshing of the circumference of the opening; (2) the dissection and the freeing up of the mucous membrane of the cheek; (3) the detachment of the palatine fibromucosa, and (4) the suturing. A knife is used for refreshing the outline of the opening; the fibromucous ring bordering it may either be entirely removed or divided. A margin of tissue left on the inner side of the opening, refreshed and turned toward the mouth, will later come in contact with the raw surface of the mucous membrane of the cheek. The freeing up of the mucosa of the cheek is begun at the very edge of the opening for refreshing and extends forward to the gingivolabial groove and backward toward the posterior portion of the buccal vestibule; great care must be taken to avoid slipping the instruments into the thick part of the cheek. When the flap is large enough so that it can be drawn to and even beyond the opposite edges of the opening, the fibromucosa near the opening is loosened, and, as far as possible, detached. The suture with "Florence" horsehair in a small bent needle of Reverdin, drawn from the back forward, offers no difficulties if the freeing up has been sufficiently liberal. The operation is most satisfactorily carried out under a local anesthetic.

In two of the four cases of reparative operations which Morestin reports, the opening was closed completely upon the first interference; repeated operations, during each of which a flap was freed from about the mouth of the opening and turned back into the opening into the nose, were necessary to close the openings in the other two cases. In these latter cases, the operator's first experience with this method of freeing the

mucous membrane from the cheek, he did not make the flaps large enough.

Morestin attempted closing the palatine opening immediately after the resection of the upper jaw for malignant tumors in three cases. Unfortunately the general condition of two of the patients was so poor that they died within less than twenty-four hours; the plastic operation had, however, prolonged the primary operation but a few minutes, and the results indicated by the union of the mucosa of the palate and the cheek were very satisfactory.

Morestin's method of closing the opening which persists after resection of the upper jaw does not interfere with the wearing of an apparatus designed to lessen the facial depression; the metallic plates used to distend the mucosa of the cheek are changed for thicker and thicker ones until the patient's mouth has become adapted to such an apparatus. The author emphasizes his belief that the reparative operation may be undertaken, in the majority of cases, immediately after the primary operation.

—Survey of Head Surgery.

Cranial Injuries in the Ambulances at the Front.

SCHWARTZ, A., AND MOCQUOT, P.

Rev. de chir., Paris, 1917—LIII—50.

The authors make report on 189 wounds of the skull, not including 64 superficial wounds, observed from July, 1915, to April, 1916. They were divided as follows:

Lesion	Deaths	Evacuated	Total
Fracture of the skull without cerebral lesion.....	12	30	42
Fracture of the skull, dry lesions, intact dura.....	2	9	11
Fracture of the skull with opening in dura.....	18	10	28
Penetration of projectile into the brain.....	38	26	64
Perforation of the skull, which is included in the following three types.....	11	11	22
Perforation by shot.....	8	5	13
Perforation by shell.....	0	1	1
Perforation by undetermined projectile.....	3	5	8
Fissure of the vault with fracture of the base.....	3	0	3
Deep contusions without fracture.....	3	1	4

They describe at length over 100 cases, some of which are reported below. The prognosis is very much better if the dura is intact. They divide the wounds into two classes: the fractures and the penetrations. In the former, the lesion is produced by a projectile usually large, with more or less force, striking the head, or by a tangential blow. The projectile does not penetrate, but there exists a focus of contusion with cerebral damage, generally of small extent. The penetrations usually are due to small projectiles driven by great force, their presence being the dominating factor.

Fractures.—1. Only the external table is injured. There is a single contusion characterized by a little bluish area, or a scraping of the surface, or a groove or slight depression of the skull.

2. More frequently the outer table alone seems to be injured, but trephining shows a fracture of the inner table also, with the fragments depressed towards the dura. This condition is one of the most important chapters in the history of war wounds. The extent of the lesion of the internal table is always greater than that of the outer, and the fragments may be stopped by the dura or may tear the meninges, or may even penetrate deeply into the cerebrum.

Case 3.—A. T., wounded July 15. Operated July 16. Multiple wounds due to explosion of bomb. Small wound of the head, size of lentil, right parietal region. Under local anesthesia, cranial wound opened. Anteroposterior incision, curving slightly outwards, down to the bone, discovered a small hole like the head of a pin. Enlargement of this with a gouge showed a depression of the inner table about the size of a lentil. A trephine opening, the size of a franc piece, was made, and at the depression it was found that the dura was opened and gave exit to clots the size of a coffee bean.

3. If the velocity of the projectile is very great or the skull thin, there is produced a complete fracture of the entire thickness of the skull. The character of the lesion is "carriage wheel," "ice fracture," "furrow," "gutter" or "funnel."

Case 9.—S. had a wound in the left paramidial and upper frontal region with loss of brain tissue without cerebral symptoms. The wound was 4 cm. long. Under local anesthesia seven fragments were removed, one of which was of the

size of a franc piece, which was depressed into the cranial cavity, like a funnel, with its free border in the brain substance. X-ray showed no projectile in the skull.

One of the frequent positions of the fragment is its horizontal or slightly oblique depression and immobilization beneath the margin of the fracture. Some lesions cannot be compared to anything. In some cases the bony lesion consists of a fissure extending more or less completely to the base of the skull.

Lesions of the Dura.—The dura may be intact, with or without lesions of the underlying brain substance.

Case 28.—F. Right hemiparesis and repeated vomiting. In the left parietal region were two small scalp wounds four centimeters apart. On incising, a sort of shallow groove was found, without opening and without apparent fissure. By means of circular trephining, two fragments were found fixed under the inner table. Dura was intact, but not pulsating. Upon making a crucial incision, black clots escaped, followed by red blood. Improvement of patient followed.

In some cases there were meningeal hemorrhages, even with intact skull. All cases of meningeal hemorrhage died.

2. Penetrating Wounds.—The dominant feature in this class of injuries is the penetration of the projectile, carrying with it foreign bodies of all kinds, especially bone splinters, into the interior of the brain.

The bony lesions cannot be classified, as they range from a simple hole to huge bony fractures, with or without radiating fissures. But the one common feature is the presence of bone fragments in the brain tissue, as for example, in the following postmortem.

Case 35.—Swelling of the right hemisphere. On incision, blood came from an area the size of the palm of a hand. Following the tract of the projectile, the probe enters a cavity containing fragments of bone, a piece of grenade the size of a lentil, and also black blood clots.

The dura is always injured, but one special form of injury is the wounding of the sinus, by the depressed fragment of bone. When this is removed, an extensive hemorrhage follows. In one case there was a wound of the lateral sinus fol-

lowed by infection. The jugular was ligated and the sinus drained, followed by cure.

Cerebral lesions are always present and are usually grave. Brain substance protrudes from the wound, before and after operation, in the form of curds. In addition to the path of the projectile, there is a cavity formed by attrition in many cases. In some cases there is an early hernia cerebri, which can be explained only as the result of an edema of that part of the brain.

Perforations.—More frequently the projectile passes entirely through the skull, and these are usually bullets. These lesions are the most fatal, as at least 50 per cent died.

Clinical Remarks.—1. Cerebral disturbances without fracture of the skull. These are due to concussion and contusion of the brain.

2. Prognosis.

The penetrating wounds are graver than the depressions of the skull. Perforating wounds are even more so. Extrusion of brain tissue makes the prognosis graver. If the substance is reddish and mixed with clots, the prognosis is better than if it is unaltered brain substance. Large skull fractures are always grave. If there are fissures and large movable fragments, the result is almost invariably fatal, whether the brain is injured or not.

Certain functional symptoms have great prognostic value. Coma due to compression is very rare. Where the latter enters, usually other factors are present. A slowness of the pulse with coma is a much graver symptom than rapidity. Partial or general muscular contractures indicate almost always extensive lesions and a bad prognosis. When associated with fibrillary twitching of the muscles of the extremities, especially the lower, it is an even worse sign. Profuse sweating is likewise a bad sign. The plantar reflex on extension of the two sides is a very bad sign.

3. Evolution of the Wounds.—Jacksonian epilepsy has been found in several cases. Slowness of pulse, seven to ten days after the operation, does not necessarily indicate untoward progress. In some cases there are symptoms of meningeal irritation, without a true meningitis being present. In some cases there is an abundant and persistent loss of cerebro-

spinal fluid. In one case it lasted ten days, but the patient got well. Hernia of the brain may be divided into two kinds: (1) The immediate hernias. They appear in a few hours, are the result of severe injuries, and the patient succumbs rapidly. (2) Hernias appearing later. These appear first several days after the injury, have no vital significance, and may disappear rapidly.

Operative Indications.—Every case which is not undoubtedly superficial should have at least an exploratory operation, as those which seem mild injuries may be complicated by a fissure, or lesion demanding trephining. The operation is governed by the location of the wound and the tract of the projectile.

Operative Technic.—1. Anesthetic should always be local if possible, as there is less shock.

2. Incision is usually of the H-type down to the periosteum.

If the periosteum is not involved, simple cleansing will suffice. If the bone is apparently intact, the same is true. But if there is a fissure, a contusion, a slight depression, etc., the extent of the lesion must be determined. In simple depressions the bone is lifted and the free fragments removed. The orifice is given a regular form and is enlarged until intact dura is seen all around.

If the cerebral symptoms require further operation: These are coma with stertor, slow pulse, dilatation of the pupil on the injured side. If the dura is opened already, the opening is enlarged sufficiently to examine the underlying brain.

Two Cases of Thyrotomy.

BRINDEL.

Rev. hebdomadaire de laryngologie, etc., Paris, 1918—XXXIX—36.

Brindel recommends a simplified thyrotomy under local anesthesia, without tracheotomy and with immediate skin suture. There is no need of suturing the two plates together. Besides there is danger of fracturing them, particularly in adults, as they are often ossified. It is sufficient to approximate the edges and to fix them in good position, bringing together and suturing the soft parts together over the cartilage.

SOCIETY PROCEEDINGS.

THE NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLGY.

Meeting of November 8, 1918.

**Report of a Radical Operation for Cholesteatomatous Mastoiditis
With Facial Paralysis and Extradural Abscess, Complicated
by Paralytic Ileus (With Autopsy Report and Pres-
entation of Specimen).**

BY OTTO GLOGAU, M. D.

DISCUSSION.

DR. G. A. FRIEDMAN said that it was perfectly true, as Dr. Glogau had stated, that in such a case 90 per cent of the blame would be assigned to the physician and the operation, while as a matter of fact the operation had absolutely nothing to do with the death. It is well known from the literature that acute dilatation of the stomach or of the stomach and intestine may occur after very mild anesthesia of very short duration. In the majority of instances this paralytic stomach and ileus combined has occurred after operations which absolutely had nothing to do with abdominal operations. Dr. Friedman said that he had no knowledge of such a paralysis occurring after an operation on the mastoid, but he did know of the condition occurring after an operation on the hip joint. That certainly had nothing to do with the operation, and the blame therefore should be ascribed to the anesthesia. Everyone knows that for some reason a certain percentage of persons are unable to take anesthesia, it acting detrimentally upon the nerve centers of the vagus nerve. Acute dilatation also occurs after various diseases, typhoid fever, pneumonia, etc., but the majority of them occur after taking an anesthetic. In some instances the paralysis has developed immediately after the

operation, in other cases long afterward, perhaps weeks. The etiology of the condition is not clear. An attempt to explain the etiology of paralytic stomach was made by Grim in a monograph published in 1911.

One theory, the mechanical theory, attributes the paralysis of the stomach and bowels to a kink in the intestines at the junction between the duodenum and the jejunum. That this is not so can be seen from the statistics of one of the authorities, which show that of 127 cases, in only 27 was this kinking found at the junction of the duodenum and jejunum. Another theory which ascribes the condition to a cerebral origin seems much more probable, and the primary paralysis of the stomach is probably due to the anesthesia which affects either the nerve ganglion or the nerve fibers. Two facts speak very strongly for this theory: One author reports experimental work which showed that after cutting the vagus above the diaphragm in dogs acute ileus paralysis of the stomach resulted, while after cutting the vagi below the diaphragm paralysis did not occur. This latter is very probable, for it is difficult to cut all the ramifications of the vagi below the diaphragm.

Another very interesting case occurred in the clinic of Professor Traube. A patient died from acute dilatation of the stomach, and at autopsy two ulcers were found at the cardiac end of the stomach. The question arose: how did this dilatation occur, when the pylorus was perfectly patent? Traube expressed the opinion that it was due to paralysis of the vagus. After dissecting carefully, it was found at autopsy that the two ulcerations at the cardia had entirely destroyed the vagus in this region. This certainly shows that the condition is of nervous origin.

How does this occur after anesthesia? After anesthesia there must be the affection of the vagal nuclei. It was proven that the dorsal nucleus of the vagus has another function than the ambiguous nucleus of the vagus, and it therefore is probable that ether or chloroform affects the nucleus in the vagus, in some cases causing simply an ischemia of the nucleus and in others the degeneration of the cells, while the ambiguous nucleus has nothing to do with the musculature of the stomach but with the musculature of the larynx and esophagus.

gus. It may be there is in some predisposition, and in this way the acute paralysis is the primary condition and what is generally considered the primary is the secondary through the pressure of the enormously dilated stomach upon the duodenum.

Paper: Report of a Case of Brain Abscess.*

BY ISIDORE FRIESNER, M. D.

DISCUSSION.

DR. JOHN GUTMANN expressed some surprise that with the very slight indications present Dr. Friesner should have gone straight to the cerebellum as the site of the trouble. The slow pulse of 40 pointed toward an abscess of the brain, but what was it which pointed toward the cerebellum?

DR. FRIESNER said that the patient had stopped breathing before the cerebellum was opened.

Replying to queries from Dr. Blackwell, he said that the mastoiditis was on the right side, the labyrinth was active and that there was no spontaneous nystagmus. The patient did not vomit until the morning of the fifth day. The only paralysis was a slight affection of the external rectus muscle of the right eye.

DR. BLACKWELL said he had never seen a case of cerebellar abscess in which there was not nystagmus.

DR. FRIESNER replied that he had seen several cerebellar abscesses without nystagmus, and on the other hand he had seen one or two temporosphenoidal lobe abscesses with nystagmus.

Paper: Report of a Case of Temporosphenoidal Abscess of the Right Lobe.†

BY HUGH BLACKWELL, M. D.

DISCUSSION.

DR. FRIESNER inquired whether Dr. Blackwell removed the gauze wick in doing the full dressing on the following day.

DR. BLACKWELL replied that the drain was removed and replaced at each dressing.

*See page 90. †See page 92.

DR. CARTER asked whether, in view of the fact that the gauze wick permitted an accumulation of pus and did not give sufficient drainage, on another occasion Dr. Blackwell would not in the first instance employ a drainage tube. He himself was not favorably impressed with the value of gauze as drainage material, since the interstices become filled with purulent material, and after a few hours it does not drain properly.

DR. ALFRED KAHN was interested to know if a culture was made from the abscess cavity. Brain abscesses are not always virulent. On autopsy brain abscesses have been located, the subject having died from other disease, and the consciousness of a brain abscess was never known by either subject or surgeon. A brain abscess may be absolutely latent (entirely walled off), the patient not showing any sign of brain involvement. The brain should only be explored, having something definite in mind. Having the above facts in mind, an exploration may do more harm than good. How often is the brain explored and no abscess discovered? And even if an abscess cavity is entered, is the pus infectious? If it is sterile pus the abscess were better left alone. Laboratory reports should be carefully noted in cases of suspected brain abscess. Our clinical evidence in many of these cases is nil. Who among you experienced men would have his brain probed without definite clinical signs? Dr. Kahn said that this opinion was strengthened in his mind by animal experimentation, and in one instance which he saw clinically. In this case, while of course it could not be established positively that the cavity was sterile, there was a fistula opening through the middle fossa and communicating with the attic, leading about an inch and a half into the temporosphenoidal lobe. In doing the mastoid operation upon this case, the middle ear was entered in the usual way, and granulation tissue was observed over the roof of the attic, the fistula leading into the middle fossa of the skull. A probe was inserted, and much to his surprise it started upward, and it continued upward for at least an inch and a half into the temporosphenoidal lobe. The patient is still in the hospital, and is doing very well. The cavity was not entered nor packed, and no drain was inserted in the temporosphenoidal lobe. That was ten or twelve days ago.

DR. GLOGAU said he recently reported before this section a

case of brain abscess that could hardly be differentiated from apoplexia. The patient lost the faculty of speech, became paralyzed on the right side. Dr. Glogau said he had the same experience as Dr. Blackwell. The pus could not be reached at the level of the tegmen tympani, but much higher up, after removal of the squama. He considers hernia of the brain not at all an unfavorable occurrence. He believes it to act as thorough decompression and permitting of the easier escape of the decomposed brain particles. By means of the applications of paraffinized paper the hernia may be prevented from becoming excessive and the closure of the exposed portion by skin facilitated.

In Dr. Friesner's case the boy has told the truth. Children in their early childhood when left handed are forced by their well meaning parents and teachers to adopt righthandedness. Thereby they develop another speech center at their right brain hemisphere. When such individuals suffer a brain abscess or apoplexia on the right side they lose for a short while the faculty of speech, but soon the compensation action of the left original speech center takes place and they are soon enabled to speak again.

DR. BLACKWELL, replying to Dr. Glogau, said that the brain hernia in these cases is due to encephalitis and that it is a grave complication of brain abscess, usually preceding the death of the patient. He then referred to cases in which after an operation the patient goes on well for a few days and then at a dressing one finds a black protrusion the size of a hen's egg, which is cut off; the next day it may be the size of an apple and this is cut off, and so on, the protrusion growing larger, until the third or fourth day when death supervenes.

The case described by Dr. Kahn was evidently what is known as a stalk brain abscess. Dr. Dean in the West has had a great deal of experience with stalked brain abscesses, and observed that whenever he could find the stalk leading from the abscess to the cortex of the brain the patient would generally recover.

Replying to Dr. Kahn in regard to not operating on a brain abscess unless there are grave symptoms, Dr. Blackwell said that after hearing Dr. Dean he had felt as Dr. Kahn did, but owing to the marked symptoms that had been present in his

cases he was forced to operate. We must remember that it is the pressure symptoms that call for operation in brain abscess cases and not the results of spinal fluid or eye ground examination. For drainage he prefers tubes, but in this case he used gauze in the initial stages, for the following reason: By its daily removal and replacement it would act as a seton and result in the formation of a walled off stalklike tract leading from the abscess to the cortex and artificially convert an ordinary brain abscess into one of the stalked variety.

Replying to an inquiry by Dr. Herzig, Dr. Blackwell said that he had never employed Dakin's solution in such cases.

Paper: Preliminary Report of Experimental Studies of Brain Abscess in Dogs.

By JOHN MCCOY, M. D., AND MARK J. GOTTLIEB, M. D.

DISCUSSION.

Dr. McCoy and Dr. Gottlieb started out with these correlated problems: First, to devise a method for producing adhesions quickly between the dura and the pia arachnoid; second, to determine the effect of Dakin's solution on normal brain tissue; and, third, to use the two foregoing ideas in the cure of brain abscess.

As yet there is nothing to report on the adhesions.

The Dakin solution produces, after two days' exposure to normal living brain of the dog, an interference with the ability of the brain tissues to take stains as unexposed tissue does. The brain tissue does not take the stain so well. There is also present a sort of shrinkage of the brain substance, evidenced by vacuolization. There were also some hemorrhages present, but these may be due to traumatism. A large number of experiments have not been made as yet to say definitely that these changes occur regularly.

We are presenting a dog here this evening which has had a brain abscess produced by injecting a few drops of a staphylococcus culture directly into the brain through the dura. Two days after the infection the abscess was opened. Staphylococcus aureus was recovered by culture from the pus. A drain saturated with Dakin's solution was inserted into the abscess, and a dressing, also saturated with Dakin's solu-

tion (0.48) per cent was applied over it. In a few days the discharge of pus ceased, and seven days after the original infection the edges of the skin were freshened and sewed together. The dog had a slight weakness of the limb on the opposite side, but as soon as the drains were removed this disappeared. We shall destroy this dog and with your approval shall present his brain to this section at some future meeting.

The work was done in the department of experimental surgery at New York University and Bellevue Medical College, the Laboratory for Clinical Research, and the Pathologic Department of the New York Insane Asylum. Dr. Dunlap rendered invaluable aid and assistance in making some of the sections and passing his opinion on them all.

DR. FRIESNER said that the subject was not one that admitted of discussion and should be received with appreciation and interest; for such work is exceedingly valuable.

KR. KAHN asked what percentage of dogs lived after the exposure, and how many died within twenty-four hours after operation.

DR. J. MORISETTE SMITH asked if Dr. Gottlieb did not think the experiments would have more value if the streptococcus had been used instead of the staphylococcus.

DR. KAHN asked what percentage of dogs lived after having been injected and how many died within twenty-four hours after operation. He further said that he has been doing some experimental work along the line of immunization, and found that in injecting some of these materials into the brain cavity the results vary a great deal. In some cases the laboratory streptococcus or staphylococcus has no effects when injected into the peritoneal cavity; but if pus taken from a dog that has previously died from a purulent infection is injected into the peritoneal cavity the dog will almost invariably die; whereas, the laboratory germ has very little effect.

DR. GOTTLIEB replying to Dr. Kahn, said that none of the dogs died within twenty-four hours after free exposure of the brain. If proper aseptic measures are observed they will live a long time. The dog presented for observation had the brain exposed for at least seven days. After his infection the external wound was sewed up. Of course, no definite conclu-

sions could be presented, for a sufficient number of experiments had not yet been made.

Replying to Dr. Smith, Dr. Gottlieb said that one of the animals was infected with streptococcus hemolyticus, and it was proposed to do a second operation in two days, but the dog died on the second day. They hoped to continue the work and to be able to present some definite results later.

NEW YORK ACADEMY OF MEDICINE,
SECTION ON OTOTOLOGY.

Meeting of October 11, 1918.

Paper: Report and Clinical Notes of a Case of Toxic Delirium Following Mastoidectomy.*

BY JOHN A. ROBINSON, M. D.

DISCUSSION.

DR. GEORGE E. DAVIS expressed his pleasure in listening to the paper and said that he was inclined to agree with Dr. Robinson in regard to the probable toxic origin of the case. In his service as visiting surgeon at the New York State Hospital in Central Islip, Long Island, he reported several cases whose marked psychoses cleared up following the radical mastoid operation for long standing chronic ear suppurations. The symptoms were greatly improved by eliminating the toxic causes resulting from the long standing suppurative condition. It not only helped the psychic but also the physical condition; the patients improved in weight, color, and general appearance; and instead of being depressed and noncommunicative they were restored to normal health, returned to their work, and took pleasure in it. Most of the cases were later discharged as cured. In Dr. Robinson's case, the acute toxemia was probably responsible for the psychic condition.

DR. HELLER said if one considers that perhaps all psychic conditions are due to some sort of chronic toxemia, this case would probably come under that grouping, for of course the tendency nowadays is to consider everything functional, really an organic condition due to some toxic disturbances. But if we regard the case as direct insanity or dementia resulting from a specific toxin in the ear, it is not the cause. It is not uncommon for a woman at this age, with no children, to go into a psychic state. This woman was apprehensive of the operation, and it resulted in that condition. Dr. Heller said

*See page 86.

that he did not think that any specific toxemia of the mastoid itself had anything to do with the woman's condition. It was simply the fact that she had to go through with this operation, and probably any other sort of operation would have had the same result. He then cited the case of a young woman of thirty-six years who happened to live very unhappily with her husband. She was a very lovely person, and always had a horror of any sort of facial disfigurement. Unfortunately she had a carbuncle of the face and lip which necessitated her being operated upon in the hospital. After the operation everything went well until about the fifth day, when during the temporary absence of the nurse this woman got hold of a mirror, looked at herself, and was so horror stricken that before anyone could interfere she jumped out of the window and killed herself. She had been living under a nervous strain for several years, and the sight of her face was the last straw that tipped the balance.

DR. JULIUS WOLFF told of the case of a man patient with very much the same character of case as that described by Dr. Robinson. This man's home life was very distressing to his wife and two daughters. He lost his temper on the slightest provocation, and made things in general very unpleasant at home. This continued for several years, when he consulted Dr. Wolff for pain in the right ear, and gave a history of having been deaf in that ear for many years. Examination showed a purulent ear, and closer investigation revealed a communication with the antrum and a large cholesteatoma. The ear was operated upon by the radical method and the results were wonderful. A complete change took place in the patient's psyche, and he became as nice and pleasant as could be desired.

DR. WENDELL C. PHILLIPS inquired regarding the character of the drugs the woman had been taking in her previous treatment. He also concurred with Dr. Heller in doubting that the mastoid operation itself, or the chiseling during the operation was liable to produce a toxemia resulting in a condition of this kind. Out of the hundreds of mastoid operations performed yearly in New York and the vicinity this psychic condition following such operations is almost unheard of. Dr. Phillips said that he could not recall any such condition that

lasted more than two or three days, and he had very grave doubts whether in this instance there was not some other entirely outside cause for the delirium.

DR. KERRISON said that in his opinion it would be quite illogical to conclude that Dr. Robinson's operation or his method of treating this case was in any way responsible for the peculiar symptoms, or that any modification of it would in any way have changed these symptoms. We have to recognize that many persons who go through life with the reputation of being sane are yet so neurotic and excitable, in some ways so unbalanced, as to represent a fine borderline between sanity and mental unbalance. Given such an individual, any sudden shock or even any severe prolonged strain, mental or physical, might result in an obvious mental disturbance. In such a person an operation, an automobile or railroad accident might bring this result. It would seem that Dr. Robinson's patient represents this borderline between mental stability and unbalance. She was also at the menopause. Probably the mastoid operation brought into evidence a preexisting mental defect without being its actual cause.

DR. ERNST DANZIGER told of a case of sinus thrombosis in which the patient suffered from acute mania for several days after ligation of the jugular vein, and he had attributed this mania to a change in the circulation of the brain, for it ceased in a few days. He agreed with Dr. Kerrison that in the case of Dr. Robinson's patient it was simply the result of the shock under the existing conditions. He then cited the case of a young man who, being very desirous of entering the army, had been operated upon for a hernia. At the end of the first week after the operation he developed an acute mania, which was simply the result of the nervous overstrain and shock, and not the result of any toxemia, as there was no septic focus of any sort.

DR. ALFRED KAHN said that mental disturbance following operations on the ear, mastoid or mainly the adjacent tissues to the mastoid, such as the sinus, dura, or operations for brain abscess, that the mental disturbances usually called "state of delirium" were distinctly different in type, the delirium usually depending upon the causative factors. That a mental disturbance could be caused by direct irritation "trauma," or

by irritation due to toxic involvement. These can be further classified by delirium due to toxemia and irritation combined, or by irritation and toxemia combined. In the first place, the toxemia being the most important factor; in the second instance, the irritation is the most important factor. The causative factor should be determined, if possible, as the prognosis in any given case might importantly be determined in that factor, as in the case of toxemia occurring in the course of a recent case of influenza pneumonia which he will relate.

Dr. Kahn said that in his opinion the mental condition arising from irritation would be sudden and would come on in a very few hours; whereas, a toxic condition would develop only after a period of time. Supposing a man was injured as in an accident; he becomes unconscious and has a different kind of delirium from a toxic condition. A man injured in a railroad accident, for instance, may rock from side to side on his bed, and may void his bowels and urine unconsciously. You have a muttering delirium. This form of delirium is due to irritation to the nervous system. It may be ascribed to a toxic condition, but it is mainly traumatic.

On the other hand, take a case where there is a slow formation of poison. In a recent case of influenza pneumonia seen on the first night of the disease, the patient, a young woman of twenty-seven years, had a temperature of 105, a double bronchial pneumonia, and other symptoms of a typical influenza pneumonia. She also presented a peculiar condition of impaired hearing, so that one had to address her in a very high tone of voice. (The patient's hearing was normal before her sickness.) When seen two or three days later the patient had developed a state of mental aberration which was purely toxic. She was not tossing from side to side, but had more or less of a desire to get up, to distrust the nurse and to consider her mother an enemy, etc. In this case, having the impaired hearing on the first visit, with, on the second visit, no tendency to improve, but gradually growing worse and showing the mental impairment, which was also progressing worse, a prognosis of a bad termination was given. This was evidently a toxemia of nerve tissue. The hearing was first involved. If her hearing had shown a tendency to improve, though the delirium or brain disturbance was intense, other

conditions being equal, a favorable prognosis would have been given; but the hearing tended progressively worse, the opinion then was that other nerve tissues would act likewise, that the toxemia was very severe, and hence a bad prognosis was given. The pneumonia cleared up and the temperature returned to normal, but the patient never returned to a normal state mentally, and died from the toxemia, being almost totally deaf in both ears. That was a purely toxic case.

It is important to observe the distinction between an irritation and a purely toxic condition.

DR. ROBINSON, closing the discussion, said that he had tried to bring out the fact that prior to the operation the patient had showed a certain type of instability. She was very highly educated and the surroundings in her home showed a keen sense of the artistic and of the good things of life. The manner in which she reacted to all doses of opium was very curious. Instead of being quieted she was stimulated and became excited. The pain was continuous. She was tremulous and tearful, and very apprehensive in regard to her condition.

In studying the case it was surprising how few references could be found to any similar cases after mastoid operation. Only a few could be found in foreign reports, and those were associated with chronic suppuration.

An Improved Plugged Stethoscope for the Detection of Malingering.

By JOHN LESHURE, M. D.

Instead of plugging the earpiece of the stethoscope with wax or cotton, a threeway valve, such as is used for bladder irrigation, is connected with the tubing leading to the earpieces and the chest piece.

This enables the examiner to switch the sound into either ear or to exclude it altogether without removing the stethoscope from the registrant's ears and without his knowledge of what is being done. Some of the registrants have been coached, and naturally assume that if the apparatus is removed from the ears and then replaced it has been changed and govern their replies accordingly.

With this appliance malingering can be readily detected, especially if it is used with the registrant's back toward the

examiner. The small valve tip is connected with the bell, and it may be necessary to wind this with one or two turns of adhesive to make it fit the stethoscope tubing. The other two tips are larger and fit the earpiece tubing perfectly. On the top of the valve stem is a small arrow. This should be disregarded, as it indicates the direction of flow when used for irrigation.

When the valve lever is in line with the right hand tube the sound enters the left ear, and vice versa. In other words, the sound is excluded from the side corresponding to the long axis of the lever. A midway position excludes from both ears. The valves work rather stiffly at first, and the screw should be loosened and oiled if necessary. For voice tests the ordinary stethoscope bell may be used, or a small funnel may be substituted if the bell is too small.

For testing with tuning forks the chest piece, with a hard rubber diaphragm, has proved most satisfactory, and transmits the sound very well. Only the lower pitched forks (128 and 256) should be used, since it is difficult to exclude forks of higher pitch. If necessary to use these or the conversational voice, a long tube (six or eight feet) may be connected with the apparatus. At this distance the earpieces will prevent the entrance of the sound except through the channels desired. The threeway valves are very inexpensive and may be obtained from any supply house.

A Double Auscultation Tube for Demonstrating Inflation Sounds.

By JOHN LESHURE, M. D.

This consists of a short tube fitted with the ordinary ear-piece for the patient's ear. Connected with this by means of a Y-tube are two tubes, one for the instructor, the other for the student.

The instructor can thus "listen in," as it were, and make sure that the student hears what he is expected to hear, and that he has the catheter properly placed, or if desired, the instructor can demonstrate quite rapidly to a number of students in succession any unusual case and save considerable time in routine work.

DISCUSSION.

DR. JOHN W. DURKEE asked if the use of the stethoscope had proved satisfactory. His feeling was that the rubber tubing of the ordinary stethoscope was too short and the earpieces did not tightly close the good ear. The result was that the patient could hear, with the good ear, the voice when whispered into the bellpiece of the stethoscope, the voice being transmitted through the air and not through the tube of the stethoscope closed with wax.

DR. KERRISON thought the instrument presented by Dr. Leshure would serve a very useful purpose. The stethoscope test for malingering had proved a very useful one. Objections to it by the usual method were (1) that the wax used to occlude one earpiece might be detected by the person examined, and (2) that in having to change the earpieces so that the occluded one would be placed first in one ear and then in the other, the angle at which the earpieces are inserted into the auditory canals is quite different. This might be noticed and allowed for by an acute individual. Dr. Leshure's modification enables one to occlude either earpiece at will while the instrument is in situ, and adds both to the convenience of the physician and to the accuracy of the test.

DR. PHILLIPS said that in his opinion the most useful part of the instrument was the little lever, yet it was one that the patient could "get onto" very quickly, as it would be easy for him to watch for the movement.

DR. ERNST DANZIGER asked Dr. Leshure to explain a little more fully how the apparatus was used, and said that while shutting off both tubes he still could hear the discussion. He believes that the use of the Bárány noise apparatus was the only reliable method of testing the hearing of one ear.

DR. LESHURE explained that the reason why Dr. Danziger heard conversation around the room so plainly was that the magnifying diaphragm increased the intensity of the sounds. With the ordinary bell they would not have been heard.

DR. GLOGAU said that the instrument has the advantages of examining the patient from behind his back. If the length of the tube could be standardized, we would have an international method of testing, especially if it were combined with

the use of electric tuning forks. The method is simple, convenient and ingenious.

DR. BLACKWELL said that in common with many of those present he had had some experience with draft board work. It is a fact, of course, that one can hear conversational voice with both external auditory canals occluded. He formerly had great faith in the White apparatus, until he discovered that it was possible to hear with the noise being produced in both ears; he then concluded that the only satisfactory method of eliminating audition was with the aid of the Bárány noise apparatus.

By modifying Dr. Leshure's instrument, as has been suggested, using a standard tube of definite diameter and greatly increased length, employing a uniform sound produced by striking a particular tuning fork with an exact degree of standardized force, we would have a device which at best would only be useful in determining unilateral deafness of a minor degree, as the normal ear would, unless occluded by a Bárány apparatus, be very apt to appreciate a sound loud enough to be used as a standard for military acceptance.

Furthermore, these degrees of minor unilateral deafness are not usually sufficient to exclude the individual from military service.

An instrument such as I have described, together with a lever attachment resembling that of Dr. Leshure's, has been used for several years by the Medical Department of the U. S. Navy in diagnosing simulated deafness of a unilateral character.

**Paper: Modified Technic of Blood Clot Dressing in Mastoidectomy
Which Assures Primary Painless Healing Without Deformity.
Preliminary Report, with Presentation of Patient.**

BY GEORGE E. DAVIS, M. D.

(ABSTRACT.)

DR. DAVIS expressed his agreement with Blake, Reik, Holmes and others in regard to the importance of improving the technic of the blood clot operation, which he believes is destined to revolutionize the after-treatment of mastoiditis. The successful employment of the blood clot method in mas-

toidectomy is wholly dependent on a perfect antiseptic technic, especially as one is always dealing with an infected wound in mastoiditis. The value of the organized blood clot in the healing process was observed by John Hunter, and the technic of the blood clot as a dressing was exploited and made practical use of by Schede, Halsted, Senn, Ochsner and Etal. Credit is due to Sprague of Providence and Blake of Boston for its adaptation in mastoidectomy, and especially to Reik of Baltimore for popularizing it.

Holmes, in his address at the International Congress held at Boston in 1912, stated that: "The success of the blood clot method in a wound like the mastoid, which can never be made entirely aseptic, depends primarily upon eliminating as nearly as possible all infective matter, and secondly, upon the bactericidal properties of the blood."

From the operative standpoint, therefore, the most expert surgeon may not hope to remove all diseased tissue and bone, but he may attain that degree of success that in some cases (not in all) the antiseptic properties of the blood may resist what infection remains. Physiologically, the blood clot dressing, as originally conceived, is based on the principle that if blood is admitted into a sterile wound of soft or bony tissue the clot will organize and facilitate healing, with obliteration of the dead space.

The ideal technic to render the mastoid wound entirely aseptic is to sterilize the wound with antiseptics at the time of operation, finishing with a packing of iodoform gauze, which is allowed to remain in twenty-four hours before admitting the blood clot.

The following simple and effective technic was employed in the cases reported: Exenteration of all infected and diseased tissue, as far as consisting with safety. In simple mastoidectomy, after thorough exenteration of the mastoid and establishment of free communication through the antrum and aditus into the tympanum, a free incision of the membrana tympani is made, and with a piston syringe the tympanum is flushed from the mastoid through the canal with a 3 per cent iodine solution and then with warm alcohol, followed with warm sterile normal saline solution. Then the mastoid is packed with iodoform gauze and closed to the inner angle,

save for a space for one end of the gauze to protrude. In twenty-four hours the packing is withdrawn, and the bleeding occasioned by its withdrawal is allowed to fill the wound cavity. If sufficient blood is not forthcoming a nick or cut with knife or scissors is made in the angle or margin of the flap to supply enough blood to fill the cavity. The subsequent treatment, after turning in the clot in simple mastoidectomy, is to close the lower angle of the wound with adhesive plaster and remove the sutures early, the second or third day. Silkworm gut is used, and before removal a 3 per cent solution of iodine is applied to prevent possible infection of the blood clot.

The postauricular wound heals in a few days, and as the blood clot supports the soft tissues, little or no depression or deformity results. The middle ear usually ceases to discharge in a week or ten days, although occasionally it lasts longer.

In radical mastoidectomy the postauricular wound is closed completely, and the mastoid cavity, tympanum and canal are packed with iodoform gauze through the enlarged meatus. The next day the gauze packing is removed and the entire cavity, to the level of the meatus, is allowed to fill with blood occasioned by its removal. If sufficient blood is not thus obtained, the tragus is cut or nicked to supply the balance. The meatus is then covered with a film of cotton or layer of sterile gauze, which is then covered with vaselin or K. Y. lubricant, and over all an outer dressing is adjusted, which is changed daily. The sutures are removed on the second or third day. Before the sutures are removed a 3 per cent iodine solution is applied along the wound margin and over the sutures to avoid infecting the deeper tissues and clot as they are drawn out.

The clot begins to disintegrate in three or four days, and this may be encouraged by the insertion of small gauze or cotton wick drains saturated with a 10 per cent solution of carbolic glycerin. Usually the absorption of the clot is complete in ten days to three weeks, when the bony cavity should be covered with a thin, pink, granular membrane which later becomes smooth, lustrous and fibrous. Should exuberant granulations appear on the median tympanic wall over the oval and round windows, 50 per cent silver nitrate solution is applied after drying the surface. This drying of the surface

before applying strong silver solutions is an important point in the technic, since it prevents pain and reaction, moisture being essential to the conduction of sensation.

Nine consecutive cases, from May 19th to August 15th, were cited in detail, the healing being complete in five to ten days, and the ears dry in one to two weeks, with the exception of one case complicated with sinus thrombosis, which required three weeks.

DISCUSSION.

DR. W. C. PHILLIPS expressed deep interest in the reports of the cases submitted by Dr. Davis and said that whereas he had come to the meeting in rather a doubting spirit concerning the blood clot method, the results reported by Dr. Davis had somewhat modified his attitude. "One swallow does not make a summer," however, and one cannot take the few cases reported as constituting sufficient data to warrant a departure in surgery of the mastoid process. Dr. Davis was certainly to be congratulated upon his plan of action, and the procedure followed in these cases was certainly different from that pursued by other advocates of the blood clot method of treating wounds.

Dr. Phillips said he clearly remembered the consternation which prevailed among the men when Dr. Sprague reported having had so many cases and so many successful results, and at the time he suggested that the Doctor must have a class of cases in Providence different from those encountered in New York. As the years have passed, the method has rather fallen into disrepute, even among those who still advocate it. It is probable that Dr. Blake now operates very little; certainly the men in active work in Boston do not use it to any great extent, and not much is heard of it from Baltimore. Dr. Holmes uses it to some extent and gets some good results. His plan is to make as thorough an extirpation of the diseased tissue as possible, and then to flush the bony cavity for fifteen minutes to half an hour with peroxid of hydrogen, using a syringe. After he feels that any remaining infected material has been thoroughly washed away, the wound is dried and washed two or three times with alcohol. Then an incision is made in the lower portion of the flap, from which he obtains a supply of

clear fresh blood. The wound is then closed.

Dr. Davis suggests a different method, and his plan would seem to demand careful attention and a fair trial—that is, his plan of treating the wound and having it packed for twenty-four or forty-eight hours, using iodoform gauze. He could see no special reason for packing with iodoform gauze. Possibly the Carrel method might be applied with advantage. The thorough cleansing of the wound seems to be the main point. The method is well worth trying, for certainly we should make some effort to shorten the long period of time required in the healing of these cases. We certainly have not yet reached the millennium in the after-treatment of mastoid wounds. There are many questions to deal with outside of the mastoid process—dyscrasias, individual peculiarities, and the like—that tend to interfere with the success of any treatment. So far as the blood clot treatment is concerned in the radical mastoid, there does not seem to be any particular benefit to be gained by it, for there is a large wide open bony cavity which must be covered with epithelium at the earliest possible moment, and it is difficult to see how the introduction of a blood clot there can have any good effect.

Dr. Phillips said that he did not mean to unduly criticize the method by expressing these views, for he certainly intended to try it, as one should test out any method that offers any possibility of helping to shorten the after-treatment of these operations.

Dr. ERNST DANZIGER said that whoever had employed the blood clot method had had success in certain cases. In his own experience he had found that those cases which had free pus healed much better than the so-called hemorrhagic cases, for the reason that when a mastoid is operated upon during a hemorrhagic osteitis it is almost impossible to see whether or not one has done thorough work. The mastoid operation is often performed to establish a thorough drainage from the middle ear, to allow a restitution to normal conditions in this location; by closing the mastoid wound immediately this object is frustrated. Dr. Blackwell had done some very excellent work in this line by cleaning out the attic; but not everyone was so skillful as he, and in certain instances one must be very chary about using this method.

DR. HERMAN JARECKY said that Dr. Davis' work was of extreme interest and any method suggested to shorten the healing was certainly worth adopting. He himself had tried for the past few years, after exenterating the mastoid thoroughly, to allow the wounds to granulate, and if no suppuration existed to gently curette and allow the cavity to fill with blood. He then closed the wound except for the lower angle, which was left open for such drainage as might be needed. The results have been excellent. Iodoform gauze having caused irritation and a reddening similar to erysipelas in a number of cases, he had discarded it for some time.

DR. I. M. HELLER said that the value of the blood clot depends on the infection with which one is dealing. Everyone has seen good and bad germs. And some infections are so mild that it is safe to close these wounds. As Dr. Danziger said, where there is a great deal of pus and we find the mastoid is reamed out it is easy to cleanse the case, and such heal very nicely; but one would hesitate to use this method with the streptococcus mucosus. Cases where there are distinct acute symptoms—tenderness, temperature and very little or no swelling behind the ear—are not good for this treatment; whereas, others, such as where a child comes in with a subperiosteal abscess, the ear sticking out, no temperature, and the condition looks worse than it really is, are favorable ones for this method. Dr. Davis spoke of rendering the cavity aseptic by antisepsis. Can one be sure there will be no reinfection? After all, it comes from the nasopharynx through the eustachian tube. How can one be sure that he is closing the portal of infection by this method? True, if the patient is in the hospital and a reinfection occurs after the wound is closed, it can be reopened and, after all, no harm would be done. Dr. Heller then cited an instance in which he had operated upon a typical longstanding case of this sort. After opening the cortex the mastoid was all shelled out, and he took the chance of closing it with a blood clot and got primary union. The young man was back at his work in two weeks. He was delighted with the result until his friends who had had mastoid operations told him that they had suffered for six or seven weeks, and then he became very anxious and wanted to know if anything had been left behind.

DR. KERRISON said that it was now a generally accepted fact that the "blood clot operation" on the mastoid had fallen into disrepute. This is due chiefly to the fact that, however thoroughly we eradicate diseased tissue from the mastoid process proper, the tympanum may remain and usually does remain an infected cavity. The blood clot operation, as originally advocated, has resulted in a certain percentage of cures and a certain large percentage of failures. The failures are presumably due to reinfection from the infected tympanum of the blood clot or the mastoid cavity. Dr. Davis has suggested an effort to theoretically correct this difficulty by careful sterilization of the tympanum at the time of the operation. This is in theory sound, but does not appeal to the practical surgeon as a result easily obtainable or one that could be depended on to secure good average results.

DR. GLOGAU said that the method advocated by the reader of the paper has been used for many years at the Ear Clinic in Vienna. Dr. Neumann, when discussing Dr. Holmes paper on "The Value of the Blood Clot in Operations for Acute and Chronic Mastoiditis," read before the Ninth International Otological Congress at Boston, August 12-17, 1912, said, verbally: "In Vienna at the clinic, Dr. Bondy is doing a modified form of this operation with much success. Instead of closing the mastoid wound primarily at the operation, he places in a gauze drain which, however, he intends to leave in for only three days, when it is taken out and the wound closed after it has filled with blood."

Dr. Glogau said he does not believe that we may consider a cavity sterile simply because it was packed with iodoform gauze for 24 hours. Bacteriologic examination at this time would prove the presence of germs. Uncomplicated mastoid wounds, when thoroughly cleared out, may be closed entirely, with but a small drainage opening left at the bottom for a few days. In such cases the wound heals quickly, in spite of the blood clot. In radical mastoid wounds, where a contact communication with the outer world exists, the healing by blood clot is a contradiction. To try the blood clot method in the presence of exposed dura or sinus is a rather daring undertaking. He himself closes the wound in acute mastoiditis, with the exception of a small opening at the bottom, through

which, by means of a suction pump any pus or secretion that may be present is removed.

DR. BLACKWELL asked what was the ultimate audition in the five cases of radical mastoid operation reported by Dr. Davis in which blood clot healing had been used. In his opinion, the whole question of blood clot healing after simple mastoidectomy has been adopted in a modified way by practically all otologists of the day. He distinctly recalled that some twelve years ago it was a universal custom for operators to pack the mastoid wound so tightly that it was usually necessary for the assistant to lean against the wound when the postoperative packing was inserted. In recent years operators use only one-half or one-third as much gauze packing as was used formerly. What happens in these comparatively lightly packed cases? Immediately after a mastoid operation the blood oozes around the margins of the lightly packed gauze, filling in the space between the packing and the walls of the wound. It is the organization of this shell of blood that results in a marked reduction of the size of the cavity and the time of healing, and, incidentally, in modified blood clot healing.

In advocating a surgical technic of any sort, it should be based on a larger series of cases than presented by Dr. Davis, since it is impossible to draw any serious deductions from such a small number. Dr. Blackwell said that some five years ago he himself had reported sixty-nine simple mastoidectomies followed by a modified form of blood clot dressing. His subsequent experience has caused him to still further modify and change his technic. It is difficult to see how it is possible for any man to demonstrate that by the use of a certain technic the mastoid wound would be rendered sterile; after using strong antiseptics one might secure sterile smears, but that would not necessarily mean that the wound is sterile. The use in the mastoid wound, immediately following the operation, of antiseptic solutions which are strong enough to have germ killing properties would certainly result in a deleterious effect on the local tissues.

It is unquestionable that in a great many instances there is unnecessary delay in the healing of the mastoid wounds. In recent years there has been a great improvement in this

respect, due largely to improved and more thorough operative technic, together with more rational postoperative care and dressing. Light packing, in Dr. Blackwell's opinion, is really nothing but a modified blood clot dressing, and to this should be credited the improved healing in many of these cases.

DR. DAVIS, referring to the point made by Dr. Phillips in regard to the mastoid technic, said that the operation was the same as before, but that in his paper he emphasized the after-treatment. Dr. Phillips had also spoken of the possibility of disinfecting the wound and the danger of reinfection from the eustachian tube. Formerly, when the blood clot dressing was used, mechanical exenteration was relied upon to eliminate all the infected material; in fact, antiseptics were tabooed, for it was claimed that they would prevent the clotting of the blood; accordingly alcohol and other antiseptics were avoided. Dr. Davis said he did not claim that it was possible to absolutely disinfect the deeper tissues of the wound at the time of operation. He did not think that the strength of the antiseptic solutions he used had any detrimental effect on the tissues, directly or indirectly. The use of antiseptics at the time of operation completes the surface disinfection, and the iodoform packing for the following two hours prevents any reinfection from the deeper tissues that may be washed into the wound, resulting from traumatic operative reaction drainage. Moreover, in acute cases, reinfection from the tympanum may be precluded by thoroughly disinfecting the tympanum at the time of operation by syringing with antiseptics.

Another point which Dr. Blake had suggested is to always leave the lower part of the wound open for drainage of serum. By using the packing for twenty-four hours, operative reaction serum drainage is finished and it is not necessary to leave the wound open longer. While iodoform is not a direct germicide, it does have a deterrent effect on all infections, though not so much on the streptococcus mucosus. One of the gentlemen had asked if he would be willing to close the wound with that particular infection. It was difficult to see where there would be any extra hazardous risk in closing such a wound if the patient is under direct observation. Operators all claim that it is not the correct thing to close a wound with a sinus or brain complication, but in this

instance, after packing with iodoform gauze, he closed the upper and posterior parts of the wound and five days later turned in the clot and closed the lower part with adhesive strips. Within six days, or eleven days after the operation, the case was apparently healed; the lower angle then, however, broke down, and it required a week or ten days longer to heal completely, but it did so without deformity. In this instance he had acted against the advice of all his friends who witnessed the operation, yet it healed completely and quickly.

Dr. Davis said he thought the peroxid of hydrogen which Dr. Phillips cited Dr. Holmes as employing, was useless for sterilization of the wound in the deeper tissues. As to the use of the blood clot in the radical mastoid operation, Dr. Holmes claimed it as the method par excellence. By flushing the tympanum, as just described in the paper, Dr. Davis said he had gotten as good results with acute as with radical cases.

Replying to an inquiry from Dr. Phillips, Dr. Davis said that he employs a conically pointed tip to the syringe and flushes through from aditus into the external canal, and in a few minutes uses alcohol and sterile saline solutions.

Dr. Danziger had spoken of hemorrhagic and suppurative cases and said that he got better results in the suppurative ones. That is where the iodoform packing acts ideally in preventing reinfection from the operative reaction drainage from the deeper tissues in the hemorrhagic cases.

Dr. Kerrison had spoken of the inaccessibility of the tympanum for sterilization, the difficulty of getting drainage where the blood clot is used, and the liability of infection of the clot from the tympanum. The technic described in the paper obviates all these difficulties and dangers. The tympanum may be reached for sterilization by antiseptics through the aditus, as described, and drainage obtained by making free incision of the lower and posterior circumference of the membrana tympani. The antiseptic solutions are syringed through the aditus into the tympanum and pass out through the incised drum, sterilization of the tympanum is accomplished and drainage established externally through the canal, thus avoiding infection of the clot in the mastoid wound cavity.

In regard to priority in the use of the blood clot dressing, to which Dr. Glogau had referred, Dr. Davis said that he had

read the paper which Dr. Holmes presented at the International Congress in Boston, but saw no reference to the discussion cited by Dr. Glogau, nor had he found it elsewhere.

As for the percentage of successes from the blood clot method: Dr. Holmes claimed about 80 per cent in radical cases and 40 per cent for acute cases—a very large and surprising percentage of successes.

Replying to Dr. Blackwell's inquiry regarding functional results, Dr. Davis said that he had obtained better results with this method than with the ordinary method. As to Dr. Blackwell's statement that the blood clot dressing had been adopted by practically all otologists today and that his method of lightly packing the mastoid wound is a modified clot dressing, Dr. Davis said that he begged to differ with the Doctor. In fact, as Dr. Phillips and Dr. Kerrison had stated, most otologists have abandoned the blood clot dressing in any form. Dr. Davis said that he did not regard Dr. Blackwell's method as blood clot surgery in any sense. He agreed with Dr. Blackwell, however, that it requires many cases to thoroughly test a technic.

NEW YORK OTOLOGICAL SOCIETY.

Meeting of November 26, 1918.

Early Mastoiditis Without Middle Ear Involvement.

DISCUSSION.

DR. FRED WHITING: I have an experience with a recent case which I might mention briefly, because of its short duration.

A little girl, seven years of age, the daughter of a doctor here in town, living in the Bronx, had never had any ear trouble previous to her present attack; she first had pain in her ear five days before. He brought her to me, having had a skiagram made, which was unconvincing because it had been badly done. However, the little girl had well marked and definite physical signs of a mastoiditis and also a considerable swelling over the mastoid region, which was due to the infection of a postauricular gland. I advised that she should be operated on at once and took her down to the New York Eye and Ear Infirmary, where she now is. To my surprise, I found very extensive destruction of all the mastoid structures, which were unusually well developed for a child of that age. She had not only had an extensive suppurative mastoiditis, but the inner table had been destroyed over a considerable area; so much so that she had all the descending portion of the sinus covered with fibrin and granulation, and at the knee of the sinus there was a very large collection of pus which gushed out and oozed for a considerable time after I opened the skull. In order to expose the area which was covered with fibrin and granulations, I was obliged to expose quite a large surface of dura over the temporosphenoidal region as well.

The case is doing nicely and presented no unusual manifestations, and I only mention it because I think there is no question about the accuracy of the observation that it was but five days from the start, and it seems to me that it was an unusually extensive destruction for a five day inflammation.

DR. E. B. DENCH: I would like to ask what the nature of the infection was?

DR. WHITING: Streptococcus.

DR. DENCH: It seems to me in the operation of an extensive destruction of the mastoid, that these cases have suffered from some previous middle ear inflammation, just as we find in cases of appendicitis. Now, we all know that a great many of the middle ear inflammations are so mild that they give rise to very few symptoms; sometimes pain for a very few hours, and it entirely passes beyond the recollection of the patient, especially if the patient is a child, and yet when we find this extensive destruction in what was supposed to be a primary attack I am pretty certain from a rather extensive observation that these cases have had a previous inflammation in the middle ear, where we find such a large amount of free pus, such as the Doctor has spoken of. These cases have been cases where the process has remained dormant for a long time, and we are simply dealing with a recurrent attack. The history of the cases is very frequently the same as Dr. Whiting has given.

DR. T. P. BERENS: I would like to ask Dr. Whiting whether there were any evidences of previous inflammation in the mastoid, such as sclerosis?

DR. WHITING: No, there was no evidence of anything of the kind. There was an extensive destruction; as soon as I knocked off the outer table of the skull I came into a pus cavity immediately. Whatever cellular structures I encountered apparently were about of the character which you would expect in the mastoid of a child of six years of age. There was nothing there to indicate that there had been any osteosclerotic process at any time.

Another feature of the case, which I didn't mention, was the fact that the course of the sigmoid sinus was such that the knee overlay completely the posterior half of the antrum, and it was necessary to cut away a considerable portion of the posterior wall of the bony meatus in order to get around and expose the antrum fully, because of the fact that the knee of the sinus lay within a quarter of an inch of the posterior margin of the bony meatus. There was no evidence of any thickening of the intercellular osseous basement substance, and no evidence of any previous inflammation there.

DR. BERENS: The reason I asked Dr. Whiting the question

—and I am glad he answered it now—is that usually, at least in my experience, these cases do show an evidence of previous inflammatory change, such as in osteosclerosis.

It seems to me that there are two types: one in which the infection is very variant, with a destruction resulting at the end of a very few days, and the other type where you find a great destruction, plus evidences of chronic inflammation. Sometimes we do not get the history of these previous attacks of acute ears, but usually we do find discharge in the drum cavity. In a child of six years we would be very apt, especially in one with Dr. Whiting's experience, to note a scar in the drum.

DR. LEWIS: Might I ask Dr. Whiting, does he mean to infer that cases of six months or a year previous would still be lying dormant, or further back than that?

DR. WHITING: I think it may lie dormant a great deal longer than that, a number of years. That is my impression.

DR. DENCH: With reference to what Dr. Berens mentioned regarding the evidence of any changes in the bone, you must remember that at the period of five or six years the mastoid is growing pretty rapidly. In other words, the development of pneumatic spaces probably would to a certain extent obliterate any sclerotic changes. I don't think that in a patient of that age you would expect to find changes resulting in sclerosis of the bone dependent upon any previous inflammatory attacks, if these attacks had been mild, because I think that the normal increases in pneumatic spaces of the mastoid would entirely eliminate that, and I should say the extensive breaking down would be a good evidence of a previous process.

In cases operated upon within five days (I think Dr. Whiting will bear me out in this) we are almost certain to find a distinct hemorrhagic type of mastoiditis. As I understand it, Dr. Whiting didn't find it in this case. When we consider that it takes a considerable time for bone to break down, the only way to explain a case of that kind is to presuppose a previous attack.

DR. BERENS: Is the appearance of the drum membrane convincing?

DR. DENCH: I have seen cases repeatedly where the drum membrane has shown no evidence of acute inflammation, and yet the patient has given a history of a previous inflammation of the middle ear. In one instance that I am recalling rather rapidly to my mind, that gave the history of a previous puncture, there was no evidence of it as far as the drum was concerned, except loss of luster.

I have given these cases a good deal of study, and it seems to me that a previous inflammatory process is the most logical way of explaining this extensive destruction after a few days.

DR. HASKIN: Dr. Whiting, was there any influenza in that case? Was there any culture made of the secretion at all?

DR. WHITING: No.

DR. W. H. HASKIN: It is always interesting to know that this present epidemic of influenza has been accompanied by almost lightninglike dissolution of tissue from the influenza bacillus itself. Dr. Dwyer told me the other day that they have isolated the toxin of the influenza bacillus which will absolutely dissolve normal tissues, and the possibility of this having been an influenza bacillus infection in addition to a streptococcus is very possible.

In the case of postmortems that you read about, and hear about destruction in the lung, where emphysema has extended into the neck, the lung has simply dissolved, there has been little or no consolidation; in fact, in most cases of these pneumonic conditions there is no fibrous consolidation; it is a congestive condition with a tremendous dissolution of tissue—dissolution takes which apparently owing to the formation of the toxin of the Pfeiffer bacillus. Is it not possible that the rapid dissolution of the mastoid cells may have been due to that same toxin of the Pfeiffer bacillus, in addition to the streptococcus?

DR. WHITING: The organism that was found was the ordinary hemolytic streptococcus. The child's temperature history, it seems to me, would hardly warrant the assumption that it had had an influenza. The highest temperature that the child ran was 104, which it had for but one day. The highest temperature on any other day of the five was 102½,

and it did not have any of the ordinary manifestations of influenza—it didn't have the severe nasal condition or anything of that sort.

DR. HASKIN: There is another interesting thing about that. We have had quite an experience at West Point with influenza—some five hundred cases. None of those cases that had very high temperature—104 and 105 at the onset, with the acute symptoms of bone-breaking pains, had any serious after-results. The only serious after-results occurred in cases that started mildly, without very much pain and ache, and temperature running from 100 to 101 and 102, and those were the majority of serious cases where fatalities have occurred. I refer to the men in the cantonments. I know that all of our cases in which we had pneumonic complications were cases that apparently had a mild case of influenza, and the temperature would drop within two or three days to normal, and we would send them to the convalescent wards, but we would have to take them back within twenty-four hours.

We had only one death and that was a boy who was underweight and underdeveloped.

There is another thing, Dr. Whiting: you rarely ever find the Pfeiffer bacillus in the nasal secretion; we did not find the Pfeiffer bacillus secretion in those men until we had taken a special culture.

DR. FRIESNER: It seems to me the anatomic peculiarity of Dr. Whiting's case lends itself rather to Dr. Dench's theory. I think the forward position of the sinus, overhanging the antrum, is probably due to repeated antrum inflammations, which have interfered with the development of the posterior antrum wall. At all events, that type of mastoid is frequently found in ears that have been the seat of repeated inflammation.

DR. DENCH: According to my experience with the present epidemic of influenza, all of the inflammations of the middle ear have not been characterized by serious symptoms. I think mastoiditis is fairly rare.

DR. HASKIN: We had 975 cases of empyema.

DR. DENCH: I know in the general hospital the empyemas have been comparatively rare, as compared to the number of lung infections, and I am rather holding that over you as against that argument; that is, if you develop so much pus

in a recent case; if that has been your experience there, I should think that might explain it. I know that we had a great many pneumonia cases in the general hospital.

DR. HASKIN: On the question of those empyemas, Dr. Dench, quite a large number of postmortem examinations have disclosed a great many cases where there are pockets of pus in the most peculiar positions, the mediastinal position—the pus conditions exist there.

Cerebellar Abscess.

DR. SAUNDERS: I wish to briefly mention a case of cerebellar abscess, on which I operated and which recovered. I hope to show the patient later.

The history was briefly this: The patient had a chronic suppurative ear for about ten or fifteen years, and she presented herself at my office, complaining of extreme pain. On examination, we saw that the lower part of the drum was cicatrized, but she had a red and bulging shrapnell's membrane. I told her the danger of the situation, but she refused anything but an incision of the shrapnell's membrane. She was at the hospital twenty-four hours and went home, saying the next day that she felt much better. I heard nothing from her for two days, when she presented herself at my office, the pain having again occurred. I tried to send her to the hospital but she refused to go. In going home she had a chill and convulsions, and when she reached home she had a temperature of 105. She objected to coming to the hospital, but finally did so. It seemed to me the case was one of sinus thrombosis. I excised the vein and did a hasty radical and exposed the sinus. Before we exposed the dura there seemed to seep through the bone covering the sinus a small amount of very foul pus. Upon exposing the sinus, the sinus wall was white and there was foul pus not over the sinus itself but over the dura anterior to the sinus. The sinus was opened, and we found free bleeding from either end. I might say that the blood culture before and after the operation was negative. The only positive evidence of sinus thrombosis was found in the streptococci present in sections of the vein. The case did fairly well for a few days, but as time progressed her condition was unsatisfactory, and she complained of intermittent headache.

This condition went on for a period of about ten days, when she began to be somewhat stuporous and had another intermittent headache—one day she would feel very well; another day she would have a great deal of headache. This made me suspect some cranial complication, and I asked Dr. Lewis to see her, and we decided that she probably had a cerebellar abscess. She had no localizing signs of the cerebellar abscess, aside from the fact that at the time of original operation we found a whitened dura and foul pus in that region. The family was loath to consent to an operation, but finally agreed after forty-eight hours, when the patient was almost moribund. The cerebellar area was exposed, and I first explored the brain in front of the sinus, in the cerebellar area in front of the sinus, and was fortunate enough to open the abscess at once. It seemed to be about a quarter to a half inch under the surface, and immediately a large amount of pus welled forth. I made a vertical incision about half an inch long in the abscess and inserted two cigarette drains. Immediately after the operation the patient's condition cleared up. The second day after operation the patient's consciousness had returned; she was perfectly rational. The third day after operation she had some headache. At that time I removed the drain, and upon removing the cigarette drains the pus welled up from the abscess cavity. It then seemed to me that the drainage was not complete enough, so I took an applicator with cotton on the end of it and inserted it gently into the abscess cavity, and it seemed to me that by gentle palpation we had an abscess cavity fairly well lined, about as big as a walnut, extending downward and backward across the line of the original sinus, so that we laid the abscess cavity well open. From that time on her convalescence was uninterrupted and she finally has recovered, with a dry ear.

I mention this case chiefly to bring up the discussion as to the treatment of these cases. The lesson that I learned was that when we find an abscess, to get drainage with as little manipulation as possible. I think our efforts in this towards cure are limited, and in the past it seems to me we have done more harm than good by unnecessary manipulation.

I would like an expression of the method of treatment from some of the older men here, because I think that the younger

men are sometimes at a loss to know how far to go in a question of brain abscess.

I might say, in passing, that this patient had an active labyrinth and her condition at the time forbade any attempts at a careful examination.

In closing, I might say that I think the diagnosis of the cerebellar abscess was made chiefly upon the general symptoms.

DR. DENCH: I would like to ask what the differential blood count was in that case?

DR. SAUNDERS: I think we had a high leukocyte count and a white blood count of about 17,000 or 18,000. The polys were high—about 80.

Upon questioning her mother afterwards, I found she had during the previous winter had attacks of headache, with apparent change in disposition. During these attacks of headache she was very despondent and at times almost morose. It seemed to me that she had had a chronic abscess for some time, which for some reason had lighted up. Another thing which impressed me was this: the ease in operating on the cerebellar abscess when you have the sinus out of the way, and if I had another cerebellar abscess which did not follow a sinus thrombosis I think I would try to obliterate or get rid of the sinus before I tackled the cerebellar abscess.

DR. DENCH: I would like to say that that operation has already been done by Dr. Ballance of London and has been mentioned in a footnote in Dr. Friesner's book.

If I may speak to this for just a moment, the one thing that was very significant about Dr. Saunders' case was the foul pus discharge coming from the region of the sinus. I remember one case that I lost in my early years. A small boy was operated on for either an acute mastoid or radical—I have forgotten which. However, he had an absolutely uneventful recovery, excepting that each time the dressing was taken down it was saturated with foul pus, out of all proportion to the pus that should have been there. That boy suddenly died without a single rise in temperature, and we found a big cerebellar abscess behind the sinus.

I remember one cerebellar abscess which I saw in consultation, which we drained successfully in front and behind the

sinus. That patient made a perfect recovery.

Of course, as I am rewriting my book, in looking over my statistics, it is rather surprising to learn how few cerebellar abscesses recover. I think Dr. Saunders is to be heartily congratulated on his results. McEwen is the only one who has had success with cerebellar abscess, and he has followed Dr. Saunders' procedure. I am very certain in our earlier years we lost a good many brain abscesses by trying to hunt out every nook or cranny where suppuration exists. In any patient suffering with a brain abscess, you must remember the minute you open the abscess the patient is in an infinitely better condition than he was before the operation. Now, simply be content with the operation. Then, if you put in a drain after you have found the pus, your patient is pretty safe.

I think that is a very important point which Dr. Saunders has brought up about too much manipulation in the brain cavity.

DR. W. P. EAGLETON: I wanted to tell of one of my cases in which I intentionally ligated the sinus by a special apparatus, which I reported at the last meeting of the American Rhinological, Laryngological and Otolological Society.

The ligation of the sinus should be done in every case of cerebellar abscess, if the surgeon has an idea that the abscess is situated well forward.

Ligation of the sinus in the average number of cases, by lateral compression, by simply throwing a ligature around it, is impossible. The sinus in its descending portion lies between two fixed points of the dura, and if tied by an encircling ligation it is impossible to ligate without tearing the fixed points of the dura (they cannot be approximated laterally). In a large sinus it cannot be obliterated by an encircling ligature. In the small sinus it can be done. Any sinus, however, can be obliterated by involution, the external wall being thrown into the sinus and pressed against the posterior wall. In accidental injury to the sinus we have trouble with the control of sinus hemorrhage if we try to control it by force, because it requires great force to crowd the external wall into the internal wall. In a pervious sinus we all know how the blood rushes forth and how the surgeon has to forcibly ram the gauze in to control it; on the other hand, we can open

the sinus and control the hemorrhage by the slightest pressure, providing we do not try to obliterate it.

Recognizing these anatomic facts, I have had constructed an instrument built on anatomic lines, of which I show a picture, illustrating how in one case of cerebellar abscess, with a pervious sinus, prior to exploring the cerebellum, I obliterated the sinus above, then tied the sinus below and deliberately cut through the sinus without the loss of a single drop of blood from the sinus. The sinus was pervious at the time of the operation.

I believe that it solves the problem that has prevented the exploration and evacuation of all cerebellar abscesses believed to be situated in the anterior portion of the cerebellum. One reason why the route in front of the sinus has not been used more is because without obliteration of the sinus it is necessary to go through an infected mastoid area in order to expose the anterior surface of the cerebellum beyond the sinus. With this instrument if you expose the sinus from behind, especially if it is not a forward lying sinus, you can still keep within a clean area during exploration of the cerebellum. If a cerebellar abscess is not found the dura can be readily closed.

In the case reported to the American Rhinological, Laryngological and Otological Society, of cerebellar abscess, I obliterated the sinus, found the abscess, and instead of simply putting in a drain and waiting for results, as Dr. Saunders is now advocating, I put in an encephaloscope and thoroughly evacuated. Before I started to operate I made up my mind that the patient probably had an old abscess, and so had a capsule. After obliterating the sinus and finding the abscess, I put in the encephaloscope, thoroughly evacuated and cleaned the abscess, put in a drain. I had the drain removed and not again introduced, and the man is in the office today, they tell me—he is at work and perfectly well.

I believe that in a cerebellar abscess with a capsule, we must not simply drain and then draw out; we must evacuate, obliterate, thoroughly cleanse, introduce drain, and then after that do nothing. You have but one chance to cure a cerebellar abscess, and that is by original operation, and if we eradicate the infection by thorough cleansing I think we will never have to go in again to explore, or will never have to

put in another drain. In nearly all the cerebellar abscesses that I have gotten well, I never had to reintroduce the drain.

DR. WHITING: I don't quite get Dr. Eagleton's description of what he means by inverting the internal wall of the sinus. I would like to have him tell me how he does that, and just what he means.

DR. DENCH: May I ask why, if you simply tied your ligature over that sinus, you could not have used a piece of gauze on top of that? It would have accomplished the same thing. As I understand it, you had to pass that through the dura with your aneurysm anyhow. If you had tied the thing, it would have accomplished the same thing.

DR. EAGLETON: It would have, except with such ligature you cannot obliterate the sinus completely. If you tried to tie over a piece of gauze, you must remember you have only so much room for working, and the gauze not only does not completely obliterate the sinus, but it occupies so much room and gives little space in which to work. With obliteration by this obturator, you have a large surface to work in. It works very easily and is very easily and rapidly adjusted.

Dr. Eagleton described the operation of the instrument. You can very easily tie the descending portion with an encircling ligature. It is at the knee that obliteration, not encircling ligation, must be practiced.

DR. DENCH: If you get above the horizontal portion, you are all right. The dilatation is at the knee.

DR. EAGLETON: There is but one case in which exploration has followed ligation of the intact sinus, reported by Bourguet, excepting the case of Dr. Ballance, which has not been reported. Bourguet advocates tying the two ligatures.

DR. SAUNDERS: I did not wish to claim any originality. The idea of obliterating the sinus has been advanced before, but simply the fact was impressed upon me anew, as to the ease with which you could drain a cerebellar abscess after the sinus had been obliterated. I think that there would have been a good deal of difficulty in draining this cerebellar abscess had not the sinus already been obliterated by the sinus operation.

Acute Ear Conditions in the Influenza Epidemic.

DR. BERENS: During the recent epidemic there have been

a great many cases of influenza in the Army Hospital with which I am connected, and out of six hundred or eight hundred cases, we have had only about forty or fifty acute ears. Those acute ears developed when the patients were in the hospital, so that we were able to get at them very early. Perhaps the first seven or eight cases that we got were bulging drum membranes or slightly inflamed drum membranes, which on incision proved to be hemorrhagic. After the first week we did not get another hemorrhagic case. In all of the cases that I am speaking of the influenza bacillus was present somewhere in the general excretions. All of these ear cases cleared up within a week—perhaps two or three of them went over for ten or twelve days, but most of the ears were well within a week.

My orders were to open on the slightest suspicion of bulging. Each ear that was opened was a wet ear at once; in other words, secretion was found.

We got out of the epidemic two mastoids, one an ordinary acute mastoid in which the grippe bacillus was present and also a streptococcus; the other was a case of advanced pulmonary empyema, a surgical case; the chest had been drained very freely, and we had to do a myringotomy. The next day we did another one. That case is gradually clearing up, although I have no doubt whatever, and the X-ray shows that it is a very extensive mastoid. It is an inoperable case. The man would "go out" under anesthesia.

I simply mention this as a matter of interest, from my own personal observation of this epidemic, to show this type of case and the quickness with which you must open up the middle ear.

DISCUSSION.

DR. DENCH: We have seen about three hundred cases of epidemic influenza at St. Luke's Hospital, we have had a comparatively small number of ear conditions, and the point that has seemed to characterize these cases has been the almost complete absence of pain. I have seen cases where the patient would complain of pain upon one side, and on examining the other ear you would find the other ear equally full of secretion, and yet the patient has not complained of that ear.

We have found three of those cases. We have not found the Pfeiffer bacillus in any of our cases. Most of them have been streptococci or pneumococci. Perhaps the reason for that is that the examination was not as carefully made as it would have been under more normal conditions.

We have had very few mastoids following the epidemic. That has also been my experience in the New York Eye and Ear Infirmary, where only the ear cases come in. I would like to speak later of a case of that kind which presented rather unusual symptoms.

I would like to ask Major Berens if he found his patients having very much pain?

DR. BERENS: They had the ordinary pain of an acute otitis. I might say that the ear discharge was examined only by our laboratory, and when I mentioned the secretion I meant the general secretion. We did not find the Pfeiffer bacillus. There were so many of our people ill that the examinations could not be very carefully made, because of lack of help.

DR. DENCH: I am glad to have had that corrected.

DR. HASKIN: We had there 467 cases of influenza among the cadets, enlisted men and officers. We had only one ear complication, and that man developed a double otitis. It was rather a remarkable case, because the ear was a comparatively small part of his illness. I have never seen as ill a man as he was. He had two distinct attacks of bronchopneumonia, during both of which he was desperately ill. He then had a constitutional outbreak. After that he developed what I took at first to be erysipelas; spreading very rapidly over the left side of his face, a huge phlegmonous mass developed, which was incised, and I suppose a pint of pus came out of that face. He then developed double otitis media. All of these conditions subsided, apparently, and he was doing very well, and I thought he was out of danger, when the third attack of bronchopneumonia set in. The boy ran practically normal temperature, but was breathing fifty-two to the minute for thirty-six hours; he had evidences of edema of the lungs, his pulse was very high and ran up to about 150 or 160 and then became very weak. We had had him on digitalis and oxygen and everything we could think of, and suddenly it occurred to me to try Hiss leukocytic extract. We gave the man 10 cc.

as soon as it arrived, and the following morning we gave him 20 cc., and 10 cc. for three days. He immediately was out of danger. I never have seen such a miraculous change come over any man in my life. We had already telegraphed his people that he was expected to live but a very short time. In this case the boy is doing splendidly, but I have no doubt he has localized empyema. Another interesting thing was that in the influenza cases, according to all reports, there was leucocythemia, getting down as low as a thousand leucocytes. This boy had a leucocyte count of 7,000, with a polynuclear count of 85 per cent, and his red cells got down to 3,500,000. Three days after the third dose his red cells went up to 4,500,000, and his white cell count went down to 4,000. It is a remarkable account of leucocytic extract and I shall never forget it.

Bone Grafts in Simple Mastoid Operation.

DR. EAGLETON: In a simple mastoid, where the sinus was not uncovered, after thorough evacuation of all infection, I took a piece of bone out of the patient's shin and put it in the operative wound cavity. I then took some more small pieces and put them in and sewed the wound up tight in layers. The next day the patient had a pain in his leg but no pain in his head. When we first dressed him he had a profuse discharge from his ear which I did not like. Four or five days afterwards he had a little swelling above his ear; the removal of one stitch was followed by some pus—it discharged for three days and then healed. A little later there was a small swelling below. A probe broke it open below and let out a little pus, which continued to discharge for some time. We irrigated the ear, and it continued to discharge for three weeks. The sinus below continued to discharge for about the same length of time. At the end of the sixth week he has an absolutely normal looking mastoid; the mastoid area is perfectly flat and the man's hearing is normal. I have the X-ray plates here to show, taken before the operation and six weeks afterwards, the last time I saw the man.

The comment of the nurse who has been present at all the dressings of the mastoid cases is "that is the best mastoid that you have had, because there have been no dressings to it except the outside dressings." The appearance of it cer-

tainly would surprise anyone. Now, to my mind, it is very important, because it shows that bone graft will live, even if you have a little suppuration.

Experimental work on bone chips have shown four centimeters of a radius of a dog can be removed, bone chips thrown in and the wound sewed tight, and a year from that time the animal had a radius that on killing the dog was found perfectly normal, the chips having caused a regenerated bone, filling the space of four centimeters. That has been repeated by Bancroft, I think, twenty-eight or thirty times. Of course one case does not prove its general utility, but I believe this one case demonstrates that in selected cases bone chip grafting will shorten the length of our time necessary to obtain a closed wound and to give us a good appearance without this long, tedious dressing which we are all so tired of.

DR. DENCH: I would like to see the X-ray plate. With referenc to the time that this patient was under treatment, I understood it was about six weeks. Last year I had a case, where the man was on duty in three weeks, without bone graft.

DR. FRIESNER: I would like to ask the idea of a layer suture; what value the periosteum has under those circumstances.

DR. EAGLETON: The periosteum was closed. I always have closed the periosteum for a long time, in trying to make blood clots, with which I have not been very successful. I do not think the periosteum plays such a very large part as we have usually been led to believe. In experimental work it has been the bone chips that filled in the defects; without them they have never had the bone regenerate and give a radius that looks normal by suture of the periosteum alone.

DR. HASKIN: What precaution did you take to prevent infection?

DR. EAGLETON: We filled it with dichloramin and wiped it all out, using an oil solution.

DR. DENCH: I don't quite understand where the bone graft was taken from.

DR. EAGLETON: From the tibia. I put one big graft in and it did not fill it, so then I took a lot of chips to fill it in. All of them were covered with periosteum. As I understand bone

grafting, all the rest of the bone dies, is absorbed, but the osteoblast just below the periosteum lives. There has been contention for years as to whether the bone graft lives or whether it is simply actual framework on which the bone grows. Both are right. Part of the bone lives and part dies, but while dying acts as a scaffold on which new bone is formed.

DR. SAUNDERS: I would like to ask Dr. Eagleton how long the mastoid disease existed before operation? It was evidently a very acute case.

DR. EAGLETON: Eight days. It was a right sided case.

DR. KERRISON: Dr. Eagleton's case is certainly interesting. From the standpoint of practical aural surgery, however, the most important point has not as yet been brought up in the discussion, namely, its advisability in mastoid surgery. Bone grafting, as I understand it, has been proposed and used, principally if not solely, in cases of serious loss of bone under conditions in which the operative field could be thoroughly sterilized. A mastoid wound is necessarily an infected wound, and sterilization can never be absolutely depended upon because sterilization of the tympanum can never be absolutely assured. Furthermore, the depressions and scars resulting from modern mastoid surgery are as a rule so slight as not to justify methods of questionable safety solely with a view to cosmetic results. The method suggested by Dr. Eagleton seems to me, therefore, altogether unjustifiable in mastoid surgery.

DR. DENCH: It seems to me that Dr. Friesner struck a very important point when he asked about suture of the periosteum. Ever since I have sutured the periosteum to below the level of the antrum, my mastoid cases have recovered very much more rapidly and with very much less deformity.

Dr. Holmes, at the meeting of the International Otological Congress in Boston, brought up that point with reference to this so-called blood clot method, which is a modified drainage, and it is certainly a most excellent point, and Holmes there laid particular stress upon the suture of the periosteum. I don't know that it appears so much in his papers as it did in a talk I had with him before the paper was read. I occupied the stand of packing every mastoid and treating the

case as an open wound, but, immediately after I heard Holmes' paper I began by suturing the periosteum to a point below the level of the antrum, using very little packing in the wound, and as soon as the wound became clean, reducing the packing very much, simply putting in a drain. In other words, converting the mastoid wound into a simple sinus. I saw a mastoid that I did two weeks ago, and the drain is out, while the drum membrane is healed, and there is no discharge from the mastoid wound. That was a very extensive mastoiditis. We see those cases right along in our service, with the wound almost entirely healed in two weeks.

I think the suturing of the periosteum is a very important point, and that would bear out what Major Eagleton said, if you are careful in stripping up all the periosteum and in preserving that, I think we will all find that a very much more rapid healing will result than if this one point which has seemed to me to be of great value is disregarded.

With reference to the regeneration of bone in these cases, I have had the opportunity of operating on a certain number of mastoids, suffering anywhere from one to five years from secondary attacks, and in a great many of those I found a very large regeneration of bone. That does not always mean that the cavity in the bone has been entirely filled. In a lot of these cases you find the superficial layer of bone reformed, so that when you make your incision you simply come down upon a very small sinus in the mastoid; with your gouge you chip off perfectly normal pieces of bone—and to my mind that may be a point against the suture of the periosteum; that is, that you simply have a good surface, but the cavity still remains, and that cavity is very liable to infection.

Now, if that is the case and if this very excellent result which Major Eagleton obtained is borne out by other cases, it seems to me that the filling of that cavity with the bone chips may solve the entire problem.

DR. J. R. PAGE: I would like to ask, in the suturing of wounds and the use of bone grafts, but particularly in the closing of mastoid wounds, does the amount of dura exposed or the amount of sinus wall exposed influence you?

DR. DENCH: My own practice has been simply this: That where I have dura and sinus exposed I follow the practice

with which I have had good results. I carry one small strip of packing into the antrum and bring it out of the lower end of the wound; then I take another strip of packing of iodoform gauze and spread it over the exposed dura and sinus, and bring that out to the lower angle of the wound. That makes a small mass in the cavity. At the end of seventy-two or forty-eight hours, depending upon the case, the packing over the sinus and dura is taken out, and the other packing either removed or loosened; then a single packing replaced, very much smaller than the other one. Excepting where I have a tremendous mastoid, I make no effort to replace that packing over the sinus or dura, but simply carry a fairly small packing and make certain to get it into the antrum. If I have a foul wound, naturally I rip the whole wound open. That very seldom happens in these cases, however. In cases of streptococcus capsulatus infection, I don't close the wounds as completely as I do in the other cases where the infection is of a less dangerous type.

DR. J. R. PAGE: About three years ago, when I was closing up wounds and getting a fair percentage of quick results I had had three very successful ones in succession that left the hospital healed in about seven or eight days, when another was discharged healed on the seventh day. He had had some gauze put into his antrum to drain through the lower angle of the wound, which had been removed about the fifth day. There had been a little serum discharging, but everything apparently was well, and his temperature was normal. On the seventh day he left the hospital healed, and two days later came to the clinic. He looked a little pale, and as his temperature was 101, I sent him back upstairs and kept him in bed for twenty-four hours' observation. The next day I opened his wound and found what Dr. Dench mentioned to guard against, a pocket over his sinus that had been sealed off, with pus lying on his sinus wall. He had had healthy granulations on his sinus wall before, but he then got a sinus thrombosis, which necessitated the removal of his jugular and later developed a femoral phlebitis and recovered only after a good deal of trouble. After that, in sewing up wounds, I have been careful to pack over the sinus and keep the posterior flap away from its wall if it is exposed, and away from

the dura for several days; then take out the gauze and let it come together. In that case, there were no previous symptoms, and his sinus thrombosis developed because an infected flap lay in contact with the sinus wall.

DR. FRIESNER: I have never been able to convince myself of the value of the suture of the periosteum. In operating on cases that have been the seat of secondary mastoiditis, even without rupture of the periosteum, we found practically the same reproduction of bone that Dr. Dench has described. The cortex that is reproduced is concave instead of convex. I do not know whether a bone graft could possibly cause or result in a sclerosed mastoid—that is, whether one could by means of a bone graft create a sclerosed mastoid. It seems to me that if the mastoid should be prevented from a recurrence of infection through a bone graft, one might put the bone graft in the aditus; but if the bone graft took there, there is a possibility of its imperiling the hearing in some way.

How a bone graft could do anything other than add merely to the cosmetic result, I do not see; and I would like to ask Dr. Eagleton about the disposition of the graft in the mastoid: whether he places them in the depth. If he does not, then he simply reproduces the same concave cortex that we would find ordinarily when we do a secondary mastoid some years after a mastoid operation has healed.

THE CHAIRMAN: Possibly I have become ultraconservative, but I want to relate an experience which will explain it. Years ago when otologists began to do these blood clot operations, I (as Dr. Page said he did two or three years ago), feeling that I did not want to be too far behind the others, did a number of them. At first I obtained some very delightful results, all my patients leaving the hospital in a week or ten days, apparently healed and doing well.

Then, a little girl on whom I had operated, apparently perfectly well, was discharged from the hospital on the seventh day, and told to report back to the clinic. For some reason the child did not come back for about a week. When she did come back she had a septic sinus thrombosis, and in spite of all our efforts, excision of the jugular and removal of the septic thrombi from the sinus, the child died.

From that time I abandoned the effort to close up wounds

by blood clot and suturing the wound. I have never felt justified in attempting to close a wound in which I had exposed even a small area of dura in a suppurating cavity.

If I want to get away with a quick result, I think I am doing my patient less injustice if I wait for healthy granulations to form and then do a second operation, in which I close the flaps and leave a little sinus running into the cavity for drainage. Since I have adopted that method I have had no untoward results, and I have always felt much more comfortable about what I have done for my patient.

DR. S. H. LUTZ: It has been my practice for about four years to sew practically all mastoids, except those in which there was a large exposure of dura or sinus, and I have had some pretty rapid results. I made a practice of beveling the wound from above downward and from behind forward, so as to make the cavity much more shallow. We have all done that, more or less. I have tried to make it a practice to include the periosteum in the suture; not a separate layer of suture, but taking a deep suture, including the periosteum on the one side, passing it over and catching the other side, and I think that the cosmetic result in those cases is practically just as good. It is very much better than any of the old open wound treatments that we used to so generally follow.

To mention one case: On the 10th of September I operated on a boy who was very anxious to join the Canadian flying forces. He had been accepted by the Canadian Flying Corps, but he was here in the city, and he registered on the 12th of September. On the 17th or 18th he went over to New York to see the medical officer at the Canadian enlistment post, because they were going to close up. At that time he had a little patch over his wound, and possibly a drop or two of serum on that patch, when it was taken off, but his wound a few days after that was all dry. He was accepted by that medical officer, and on the 27th or 28th of September he left here to go to Toronto to enter the Flying School there, the ground school. He was all healed up then and had been perfectly dry for several days.

I think that in beveling the bone down from above and behind your cosmetic result is much better, because there is

practically nothing left except the scar of the original incision. There is no uneven surface.

In cases where the dura or the sinus is exposed, I have in a number of cases put in a separate drain, brought that out at the bottom of the wound, closed the whole thing up, except for one stitch at the bottom, or I brought a separate strip altogether from the region of the sinus if the sinus was exposed, or from the dura; but I have never felt particularly comfortable about that, and I have made it a practice recently to leave those wounds that had an exposed dura or an exposed sinus more open. That is, treat them more as we used to treat them: put one or two sutures in up above, but leave a great deal more room and make no attempt to close it up absolutely.

DR. EAGLETON: To my mind, anything that will do away with mastoid dressings would be a gain. I think there is nothing so disagreeable for the patient as the constant packing of the wound. The fact that there is no dressing to be made, the fact that the cavity is filled, the fact that a technic can be so well carried out that the infected bone of the mastoid can be thoroughly eradicated, and that a bone graft will live in that cavity—I think, in view of all these advantages, it is worthy of further trial.

About the introduction of bone grafts after the dura is exposed: With dura exposed, I would leave the wound open. I would not introduce a bone graft or even many sutures. If the sinus is exposed I would follow the same course.

This one case proved that the bone will live, and to my mind it is worth while, but to have it live, the technic of the operation must be perfect: infection from the external canal or auricle during the operation must be prevented.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL
SOCIETY.

Meeting of May 14, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

**Paper: The Importance of More Intimate Cooperation Between the
Various Specialists Who See Neurosurgical Cases.***

BY ERNEST SACHS, M. D.

DISCUSSION.

DR. CARL BECK, president of the Chicago Surgical Society, said that he was in a great predicament because he had to defend the Chicago surgeons, but he would plead guilty right in the beginning. He thought Dr. Sachs had presented a very interesting subject, and he was thankful that he was not in neurologic surgery any more. About twenty years ago he did a good deal of this work, and Marc Anoray reported in the tumeurs cerebrales a number of his cases of brain tumor. He imagined then he was a great nerve surgeon. A short time after that he visited London and saw Horsley's work and realized that he was not fit to be a brain surgeon. He came home and instructed his younger brother and now does not touch any brain surgery at all. He believed surgery was growing into specialties, and the general surgeon should not do brain surgery and abdominal surgery at the same time, for he could not do the right thing by his patients in that way, as the work of a specialist required a great deal of study. He recalled one case of brain tumor which he reported to the Chicago Medical Society, stating with pride that the patient had lived for nine days following the operation, when Dr. Daniel R. Brower, Sr., got up and told him he was wrong in doing the operation—that the man should never have been operated upon. He now believed that Dr. Brower was right—it was an inoperable brain tumor.

He felt it was agreed by all that a surgeon did not develop immediately after leaving college into a general surgeon or

*See page 76.

into a specialistic surgeon. One of the great mistakes was that not all those who did surgical work did not go through the general training of surgery. He believed the man who did work on tonsils and adenoids ought to be able under given circumstances to do a laparotomy; he ought to be trained in general surgery before going into specialistic work, which unfortunately was not the case. Many specialists had received no general training in surgery, and once in a while when in a tight place they would feel this. The general surgeon who was doing all kinds of surgery was disappearing; he knew of no great surgeon in this country or abroad who was doing all kinds of work in the body equally well, and many surgeons select a certain branch of surgery. Unfortunately, in the smaller towns there cannot be specialistic surgeons, but in cases of selection there should be a possibility of referring surgical work to those who were well trained in that particular kind of work.

He thoroughly agreed with Dr. Sachs that the surgeon who did neurologic work should be trained in neurology, and thought this was being overcome a great deal by the team work that existed in the institutions. There was hardly a surgeon who stood alone and who would have to examine a case from A to Z and from his own findings have to operate on any case. They work as sort of central figures and around them they have all the specialists in the various medical, bacteriologic and pathologic departments who give them their results, and those results are all considered before a definite plan of action was decided upon. If operation was decided upon, the surgeon should do it himself if he was able to; if not, he should turn it over to someone who was specializing in that line. He thought it was impossible to do any work of value except in that way. No man could be an expert in neurology and in the technical examination of serum and blood and the many other things, and they should all work together and establish the indication and diagnosis. These are the two most important factors. Fortunately, the men who did brain surgery in this country were surrounded by a staff who did that kind of work. He was sure most of the surgeons would agree with him that they did not like neurologic work unless they were specialists, but there were a num-

ber of excellent men of that kind in this country. There ought to be now a great tendency to develop neurologic surgery, for the war would bring thousands of cases requiring brain surgery and peripheral nerve surgery. He was of the opinion that there should be schools where men could go and receive that training, and to which cases could be referred, the same as is now being considered for plastic surgery. In this way a number of experts could be developed, who could spread the knowledge and work satisfactorily.

DISCUSSION.

DR. JAMES C. GILL of the Chicago Neurological Society stated that he was sure the neurologists should keep more in touch with the other specialists, and that there should be early consultations. Operation on the nervous system was often postponed until irreparable damage was done and operation could be of no service. Unfortunately, one could not look into the cranial cavity and always be sure of what pathologic condition was present, nor could they always follow out the descriptions given in the textbooks or what they learned in a general way in considering symptoms. Dr. Sachs had referred particularly to the tumors of the brain where the three symptoms, choked disc, nausea and vomiting, were so frequently looked for, but neurologists as well as surgeons saw many cases of tumor of the brain in which all these symptoms were absent.

He cited a case seen recently of a man fifty-six years of age, an accountant by occupation, who suddenly developed a paresis of the right leg and arm. He saw him the day after the onset of these symptoms, when he was a little confused in his speech, the paresis existed only on the right side and there was a history of being well up to that time. It appeared like a case of cerebral thrombosis and another neurologist agreed in this diagnosis. The blood and spinal fluid were negative except for a slightly positive Nonné reaction in the fluid and a slight increase in the cell count. The man went on from bad to worse, but had no headache, no nausea or vomiting, and the eye grounds were perfectly normal; almost complete paralysis of the right side of the body developed, he became comatose and within ten or twelve days after the onset of the trouble

he was dead. A postmortem showed a glioma involving the left temporosphenoidal lobe, making pressure and producing the symptoms that were present, but none of the symptoms that one expected to find in cases of intracranial neoplasm. He believed that operation was often put off in many other disorders of the nervous system because cardinal symptoms were not present. In epileptiform diseases that required operation they did not operate often enough because they could not make out certain etiologic factors, but went on treating the cases in the same old way, medically, without benefit when they should be referred to the surgeon. There was nothing to be lost by operation and much to be gained. Many cases of possible hemorrhage which might be relieved were put off and put off until if operation was performed it was only after irreparable damage had been done. He thought this was largely due to the fact that there was not sufficient cooperation. They were often contented with making a diagnosis, instead of calling in a surgeon at once and getting his advice as to an immediate operation. It was his opinion that with the work being done by Dr. Sachs and others along this line they would soon reach a point where more work and better work of this kind would be done.

DR. J. F. BURKHOLDER, representing the Chicago Ophthalmological Society, regretted that the president of this society had not appointed someone who was more capable of discussing Dr. Sachs' paper. He was satisfied that the ophthalmologist would have to plead guilty to Dr. Sachs and that very few of them were as intimate with brain surgery and brain anatomy as they should be, or as well acquainted with the human body as a whole as was desirable. He had often wondered whether specialists in other branches became as narrow when they grew old as the ophthalmologists did. They were apt to forget that there was anything except the eye, just as some general practitioners were apt to forget that the body had an eye at all. The contention that they should be more intimately associated was well founded; they were so liberal and democratic that there was not much fear that the various specialties could not get together. Exclusion was at one time the attitude of the members of the profession toward one another, but they were entering a new era and could be made

successful by just such suggestions as Dr. Sachs had made.

It had always been a matter of wonder to him that more men did not try to learn the ophthalmoscope. It was one of the easiest instruments to learn, much easier than the stethoscope, and there was no organ of the body where one could see both inside and outside as they could in the eye. It required a great many years to handle the stethoscope intelligently, but things were just as plain with the ophthalmoscope as a drawing on the board, most vessels and tissues being visible. It was the only instrument that helped out in choked discs, but there even the ophthalmologist was at times in difficulty. So many authors classified choked disc and papillitis synonymously, but to him and a number of his friends this did not seem rational. Gowers had drawn attention to the fact that there was something peculiar about that part of the optic nerve, because disease here manifested itself just as it might in the cortex, in the pyramidal tracts or anywhere; yet they talked of choked disc as if from a mechanical etiology only. Some cases of choked disc were due to intracranial pressure, and there was no question that Dr. Sachs was right regarding a decompression. In many cases the man who hesitated was lost because of the great damage done where the nerves entered the lamina cribosa. This was often true in cases of glaucoma as well. When thinking about decompression or surgical work on the cranium one should remember that choked disc or papillitis had been reported in eighty-three different diseases. Most eye men got very little neurologic surgery in such cases.

He believed the exact cause of choked disc was hard to state, although there were dozens of theories. One was that it was due to compression upon the vessel system around the optic nerve, but one hesitated to accept that theory. Many cases occurred after sinus thrombosis, surgeons reporting as high as 50 per cent papillitis in this and in acute mastoid disease.

Baer had given some very nice experiments upon the lymph flow, made upon human optic nerves immediately after death and upon dogs intra vitam staining. His conclusions were that the lymph flow and the optic nerve had nothing to do with the perivascular and the intersheath lymph flow. Many cases

of supposed papillitis may not be papillitis at all, or at least are very hard to differentiate.

The speaker cited a case referred by Dr. Faith, a number of years ago, where there was trouble with the fundus (pseudopapillitis), but the vision was normal. There was absolutely no sign of abnormality about the nervous system or anything else; every disease had been excluded. He had watched the case carefully for three years, seeing the patient occasionally, the pseudopapillitis remaining the same as it was years ago. One needed to be sure about intracranial complications, but when sure, the man who hesitated was lost, for where the nerves enter the eyeball they are not myelinated, as a rule, although there were exceptions, and myelinization does sometimes take place. The hypotheses regarding the etiology of choked disc were so numerous that it was hard to find one which would be satisfactory to all persons.

DR. JOSEPH C. BECK was pleased to have been somewhat responsible for the presence of the guest of the evening, and could see from the discussions that he had made no mistake in asking him to come and give his most valuable interpretations and suggestions in correlation of the various specialists in cerebral diagnosis and treatment.

He had had the pleasure of seeing him at the Washington University, while teaching at the School of Oral Plastic and Neurology, section of the Medical Reserve Corps, which was under his direction, and he said, to appreciate Dr. Sachs, one must see him at work. His understanding of the fundamental principles underlying Bárány's work is such that his opinion will not be given with any prejudice or from lack of knowledge as to its application to true neurologic conditions.

He was particularly interested in his discussion on the indications for decompression and was only too sorry that he did not know Dr. Sachs at the time when he needed him the most. He was referring to the loss of his brother, Dr. Rudolph Beck, whom most of the members remembered. He died in consequence of a brain tumor which was operable but was not diagnosed until it was too late. Although the boy suffered agonies and some of the best surgeons were consulted, in this line, they were not ready to do a decompression operation. If he had been operated he would have at least been

relieved of his suffering, even though not cured. The post-mortem examination showed that sooner or later a localized diagnosis would have been made on him and he might have been saved, or the decompression been made, as was indicated in Dr. Sachs' statements.

He again expressed his appreciation for Dr. Sachs' visit that evening.

DR. H. W. LOEB (St. Louis) thought the most important part in the excellent paper of his distinguished fellow townsman was the inference that the brain surgeons and neurologic surgeons were men who remained in their special field. That called to mind his own experience. The neurologist might give an opinion which would be of no value to the otologist, and he supposed it was the same way with the otologist when consulted by a neurologist—but he remained an otologist. This paper called attention to the requirement of having men specialize extensively, and yet to know enough of the borderline subjects to get over the borderline into the other fields when necessary.

DR. GEORGE E. SHAMBAUGH stated that while he was very much interested in the tests of the vestibular mechanism in diagnosing intracranial disease, he did not care to go into a discussion of this at the time. He was much pleased to hear from Dr. Sachs' emphasis laid upon the importance of the cooperation between men practicing in various lines of medicine. Patients very frequently consult a specialist in medicine because they have reached the conclusion that certain symptoms from which they are suffering are caused by disease of a local part. In these cases the patients are attempting to make their own diagnosis. In many of these cases the problem is not one for the specialist at all, but one for the internist. In most cases of suspected systemic infection the decision as to the nature of the trouble, and especially as to the question whether disease of the local part should be corrected, should be made by the internist instead of the specialist. In this way it would be possible to avoid unnecessary operations. The specialists are coming more and more to cooperate in their work with the internist, and this is being done in most instances without any partnership agreements. He was inclined to believe that the interests of the patient

were probably best taken care of in this way. The internist then always felt free to call in the one he felt was best able to take care of a particular case.

DR. CASSIUS C. ROGERS believed that Dr. Sachs brought out one point which should not be overlooked, and that was the point of simple operations upon the skull—not to do too much at the original operation. Unless the tumor was readily accessible, one would do more damage to the brain and patient by removing the tumor at the original operation than by a second or third or fourth operation in these cases. Surgeons did not hesitate to do two or three laparotomies on patients at times, and should not hesitate to do that many operations on the skull if necessary. It was no more difficult to open the skull than to open the abdomen, and if the surgeon knew his business it was no more difficult to operate on the brain than for the man who knew his business to operate in the abdomen. If the surgeon did not know abdominal surgery he had no right to operate in the abdomen, and if he did know the pathology in the cranial cavity he should not attempt brain surgery. He thought that not enough attention was paid to local conditions in the cranial cavity. It did not take much irritation to the dura mater to produce severe pains, as its nerve supply was the fifth nerve. Many cases of localized leptomeningitis could be relieved of the pain by removing a plate of skull without doing a decompression operation; the dura need not be opened.

As to choked disc, a patient might have great intracranial pressure without a choked disc. The ophthalmologist would say there was no tumor and no pressure because there was no choked disc, but every once in a while one saw cases of tumor or chronic abscess without this symptom.

He did not believe a flat X-ray picture was worth the price of the glass it was taken on in cranial cases. They were not worth anything unless they were stereoscopic views, and then there must be a man who could read them correctly. If the man who took the pictures knew nothing of the cranial cavity or brain they were of no more value than the films of teeth which resulted in the pulling of hundreds of perfectly sound teeth because the X-ray man said there was infection of the root of the tooth and there was nothing to work on but the word of the radiologist.

He believed all branches of medicine should work together and use each other's knowledge, taking the benefit of that knowledge and not depending too much upon the X-ray picture or upon the symptoms, but upon the findings and symptoms and X-ray pictures together. No head should be opened without a thorough X-ray examination, and if from this and the symptoms it was found that the patient had intracranial pressure one should do a decompression. In this way blindness could be prevented, even though they kept the tumor. He had seen patients with Sir Victor Horsley, who had bigger tumors on the outside of the head than brain inside. They had no pain, no gastrointestinal symptoms, and they were happy because they were relieved of their pain. The internist and the surgeon did not cure everybody who came to them, and neither could the man who was doing brain surgery cure everybody, but he could often relieve them of their pain and other symptoms and make them happier.

DR. ALFREL LEWY said that Dr. Sachs had answered one important question in regard to vestibular reactions, namely, that variation from the normal as shown by the Bárány tests, unsupported by other evidence of organic lesion of the brain, did not of itself warrant the opinion that an organic lesion existed. We knew that the application of these tests often brought about pallor, sweating, tremor and other indications of vasomotor and nervous disturbances, and it was reasonable to suppose that these disturbances may react upon the vestibular nerve and its connections so as to derange its function. As a matter of fact, it had been found by men who had made many of these tests and had developed a good examination technic that patients who at one or more examinations would give an abnormal reaction at another would react normally. He would like to have Dr. Sachs give his opinion on the converse of this question, namely, in the presence of normal vertigo, past pointing and nystagmus reactions, would he consider that an organic lesion of the posterior fossa had been definitely excluded.

DR. ERNEST SACHS (closing) thanked the gentlemen for their very generous discussion and thought he had been treated very kindly. He was prepared to be almost thrashed.

Dr. Carl Beck had mentioned one point which seemed to

him to go to the crux of the matter, and that was why the surgeons had not cooperated as much as they should. He realized that the neurologic surgeon was just as guilty as anybody else, but though the lack of cooperation went way back to their training in medical schools and the training immediately after graduation. Dr. Beck said he thought it was a very serious thing for any man to go into a specialty immediately after graduation, and it seemed to him this touched the vital point. He thought if each one would insist that none of their students should go into a specialty until he had received a general training it would add a very great deal to the care of cases afterward. He knew that one objection to this plan had been raised—the young men had spent so many years in getting their training that when they once obtained their degree they should be permitted to start in practice at once. On the other hand, they knew what a valuable thing an internship was, and he always told his young men that he thought the best thing they could do was to take a medical internship before they ever started the practice of surgery.

As to the case cited by Dr. Joseph Beck, he could quite understand his feeling about the way the case was handled, but he felt that up to the present time they had been rather handicapped in the neurosurgical cases because of the fact that the other specialists had hesitated to have their patients operated because of the poor results which had been recorded up to the present time. For example, at the International Congress in London some of the continental surgeons reported their results, giving a mortality of forty to fifty per cent. Then Harvey Cushing got up and reported a mortality in over one hundred cases of less than ten per cent. None of the continental surgeons, with perhaps one exception, had specialized in these cases. For that reason he had always urged that anyone who was doing neurologic surgery ought to be able to make his diagnosis himself. He supposed he had learned that from his teacher. Victor Horsley would never take a diagnosis from any of his associates, and yet he was associated with such eminent neurologists as Gowers, Beevor, Hughlings Jackson, and the other celebrities at the National Hospital. If he operated he decided for himself where the lesion was.

In regard to the question of choked disc, he was much

interested in what Dr. Burkholder said on the subject. They had only recently succeeded in getting the name "choked disc" adopted. Not so many years ago the ophthalmologists insisted on calling it optic neuritis. It had always seemed to him that the experimental work which had been done, the best of it in this country, had proved absolutely that those changes in the eyes variously called choked disc, or papilledema, or optic neuritis, were pressure phenomena. The most recent work, done by Parker of Detroit, absolutely proved this. He reduced the intraocular pressure in eyes in which he produced choked disc and showed how the choked disc disappeared immediately in the eye in which the operation was done. He showed this work two or three years ago before the American Medical Association.

He heartily endorsed what was said about stereoscopic pictures of the skull and believed that it was very important to be able to interpret the plates correctly, because there were a great many peculiarities in skulls which were really physiologic, and unless one was thoroughly acquainted with these one could very readily go astray. What was said about relieving patients of their pain and headache and leaving tumors on the outside of the head larger than the brains inside, he believed was one of the things that had tended to do neurologic surgery harm, because this total disregard of the appearance of patients was a very unfortunate thing. He thought the cosmetic effect should always be considered. It was necessary that aside from relieving patients of the symptoms we should try to leave their head in such a condition that they were not an eyesore to everybody else. For that reason the decompressions which were well protected by muscle and fascia were more desirable than those which led to cerebral hernias which might be very deforming. He hoped he would be pardoned for drawing attention to one statement with which he could not agree; no decompression could be said to be a true decompression unless the dura was opened, because it was the dura which interfered with the expansion of the brain more than the bone. Frequently the bone would give way, but not the dura, and he thought it was always necessary to open the dura widely.

Regarding the question about the Bárány tests, he had hoped

that Dr. Shambaugh would have some more to say on that subject, as he was anxious to know what his opinion was. The question had been asked, "Can you have a lesion in the posterior fossa if the Bárány tests were normal?" Yes, it was not at all uncommon to have tumor, even of considerable size, without any disturbance in the Bárány test. There could be a lesion of the cerebellar cortex which was quite large, and if the nuclei of the cerebellum were not affected there might be no symptoms at all. He always had the Bárány tests made, but had yet to see a case of cerebral tumor in which the diagnosis could not be made without the Bárány test.

BOOK REVIEW.

Concerning Some Headaches and Eye Disorders of Nasal Origin.

By GREENFIELD SLUDER, M. D., Clinical Professor and Director of the Department of Laryngology and Rhinology, Washington University Medical School, St. Louis. C. V. Mosby Co., St. Louis, 1918.

In his preface the author relates that his interest in the subject matter of this book began in 1904 when his friend Dr. Ewing suggested that certain asthenopics were really not eye cases but "nose cases of some kind not yet understood." From then on Sluder's interest in the nasal factors of headaches and eye lesions has been deep and constant. In 1909 Sluder presented to Dr. Jonathan Wright various specimens of tissue removed from patients of the above class for a study of the pathology. Wright's findings are set forth in the introduction to the book, and these, together with Sluder's clinical experiences, constitute the basis of the work.

In the chapter "The Nose, a General Consideration," the author states or restates some important fundamental facts. First, the nose by reason of its prominence is liable to trauma causing deflection of the septum which, though it may be only of slight degree, may give rise to headache with asthenopia. Second, the assumption of an erect posture by man has deprived two of his nasal cells of gravity drainage, namely, the maxillary antrum and the sphenoid cell, and infection is less apt to subside spontaneously. Third, the upper air passages are subject to repeated inflammations, from birth to death. These attacks bring about changes in other parts of the upper air passage as well as the nose. In the nose the periosteum is in close relation to the mucosa so frequently subjected to inflammation. Fourth, most of the cranial nerves leave the skull through the close fitting bony foramina, especially the optic, maxillary and Vidian. Headache and asthenopia must

be a symptom of a lesion of some kind somewhere, and from this standpoint the author describes three varieties of nasal disease or clinical pictures which have as symptoms headache and more or less eye disorder, to-wit: (1) Closure of the Frontal Sinus without Suppuration; (2) The Syndrome of Nasal Ganglion Neurosis; (3) The Picture of Hyperplastic Sphenoiditis.

VACUUM FRONTAL HEADACHES WITH EYE SYMPTOMS ONLY.

"A low grade unending headache is established by closure of the frontal sinus, without nasal symptoms or signs, i. e., obstruction or secretion, and is made worse by use of the eyes. These patients have ocular symptoms only. The air is partly absorbed in the sinus, and the negative pressure makes the walls sensitive. (Sluder frankly says that he has found recently that this idea was advanced prior to 1900 by P. McBride in 1891.) The floor of the sinus is its thinnest wall and has attached to it the pulley of the superior oblique. The sensitive floor is pulled on by the use of the eyes. * * * * * The mechanism by which closure is produced is a combination of unfavorable anatomical settings, such as narrow noses present, plus hyperplastic changes in the soft parts and the bone."

Clinically, the headache is frontal, but rarely may be referred to the external angular process of the frontal bone. It is either brought on by use of the eyes, or, if present on rising, is made worse by using the eyes. Ewing's sign is present, namely, tenderness at the point of attachment of the superior oblique, and internal and posterior to it. The frontal sinus is most frequently involved—99 per cent of the cases. The cause is closure of its outlet, the condition being similar to that produced in the middle ear by closure of the eustachian tube. The method of closure is described in the observations of Dr. Wright in 207 cases, viz.: (1) Enlargement of the septal tubercle or its deflection, particularly in a narrow nose—38 per cent of cases. (2) Narrowing or occlusion of the hiatus semilunaris, the uncinate process and bulla being in contact, by hypertrophic changes in the bone and periosteum—24 per cent. (3) Edema of the middle meatal vault—15 per cent. (4) Middle turbinate hypertrophy—11 per cent.

(5) Anatomic insufficiency; the vault of the middle meatus is obliterated by the middle turbinate being lapped against the external wall—7 per cent. (6) Empyemas, or coryzas which have got well but have left a degree of swelling—3 per cent.

Differential diagnosis is by Ewing's sign.

Prognosis is difficult. The simplest treatment may be successful, other cases may be most stubborn. Prognosis for operated cases is variable, according to the microscopic changes in the removed turbinate; if it shows marked perios-teal thickening and bone activity the inlet may narrow again in two to five years and reoperation is sometimes necessary.

Treatment by various commonly used astringents, e. g., two per cent silver nitrate, applied in and about the middle meatus, is satisfactory in a great number of cases. It should be tried for two weeks and if ineffective the inlet of the frontal sinus should be opened surgically; usually this can be accomplished by removal of two-thirds or three-fourths of the middle turbinate, thus also freeing the inlet to the anterior labyrinth of the ethmoid. Vacuum ethmoidal headaches occur rather rarely; the few cases that Sluder has recognized had the external tender point at the site of the lacrimal bone (instead of at Ewing's point), and the pain was described as behind or between the eyes.

THE SYNDROME OF NASAL (SPHENOPALATINE—MECKEL'S) GANGLION NEUROSIS.

In several articles which preceded the publication of this book the author has recorded motor, sensory, gustatory, ocular, respiratory and sympathetic phenomena attributable to lesions of the nasal ganglion. He reviews the anatomy at length. The ganglion is about 5 mm. in length, flat on its mesial surface, convex on its lateral, and lies in the sphenomaxillary fossa in close relation with the thin walls of the sphenoid sinus and maxillary sinus. Sluder regards the sphenomaxillary fossa as tantamount to a paranasal cell. A patient with the neuralgic syndrome will give a history of a coryza of greater or less severity. "A short time later pain began at the root of the nose, in and about the eye, the upper jaw and teeth, and extending backward to the temple and

about the zygoma to the ear, making earache; emphasized at the mastoid but always severest at a point 5 cm. back of that, thence reaching backward by way of the occiput and neck, it may extend to the shoulder blade and shoulder (less often to the axilla and breast), and in severe attacks to the arm, forearm, hand and even the finger tips." There may also be a sense of a stiff or aching throat, pain or itching of the hard palate, or a feeling that the teeth are too long, or a metallic taste, or scotoma scintillans, etc. The sense of taste is slightly less acute over the anterior two-thirds of the tongue on the affected side. The arch of the palate is higher on the affected side. On gagging, the uvula is deflected to the well side.

The sympathetic syndrome includes severe protracted sneezing, profuse, thin, hot, nasal secretion, congestion of the conjunctiva, itching and burning of the eyes with lacrimation, photophobia, etc.

Lesions of the nerve trunks supplying the ganglion (maxillary and Vidian) may produce the syndrome. Differentiation is based on the fact that cocaineization of the ganglion stops the pain of a lesion in the ganglion proper, but does not stop the pain of a more central lesion. There is often a congestion and thickening (hyperplastic postethmoiditis) at the site of the sphenopalatine foramen when the nasal ganglion is the starting point for the neuralgia.

Treatment has comprised various remedies and surgical procedures. Applications were made to the region of the sphenopalatine foramen of 2 per cent silver nitrate, etc. In more severe cases injections of phenol alcohol were used, and in the worst were operated on intranasally with the intention of removing the ganglion.

For injection of the ganglion it is cocaineized by an application of one drop, saturated solution, under the posterior tip of the middle turbinate for five minutes, and just posterior to the tip for another five minutes. Half a cubic centimeter of 5 per cent phenol in 95 per cent alcohol is then injected into or near the ganglion. A straight needle is used; it is inserted at a point 2 mm. in front of the posterior tip of the middle turbinate, and forced to a depth of two-thirds of a centimeter. This treatment has been highly satisfactory in

a majority of cases. In old cases it must be repeated three to ten times at increasing intervals of two to six weeks. The reaction following the injection of the phenol alcohol becomes more severe the oftener it is done.

Sluder lays stress on the fact that severe cases of this class are not only a terrible affliction for the patient, but they also put the surgeon to his wit's end for judgment, perseverance and skill.

HYPERPLASTIC SPHENOIDITIS.

Believing that the matter is of the greatest importance and has farreaching possibilities, because of the intimate association of the many nerve trunks in the region of the body of the sphenoid, Sluder discusses the anatomic relations extensively.

It is no uncommon thing to see a sphenoidal empyema give rise not only to its characteristic symptoms but to simulate the pains produced by all the other sinuses. This complex clinical picture can only be explained by assuming that the associated nerve trunks have become involved either by the inflammatory process or by its toxins. This assumption explains such occasional symptoms as pupillary dilatation, asthenopia or paresis of the superior oblique. Sluder has seen cases of sphenoid empyema in which the pains and aches remained unchanged despite wide opening of the cavities and cessation of pus discharge. They frequently develop headache and behave as cases of migraine. In cases of recent origin the symptoms may disappear with the cessation of suppuration, then recur after a coryzal infection, even without recurrence of the suppuration. Sluder believes that "a large number of the frequently recurring headaches, of whatever length of time standing, that usually bear the name 'migraine' that are met with in the general practice of medicine, that have defied diagnosis and treatment, are sphenoidal inflammations existent, or were started as such."

From an examination of bony tissue removed from 185 of Sluder's cases, Wright has confirmed the clinical diagnosis of hyperplastic sphenoiditis. The specimens comprised portions of the anterior and inferior walls. In essence there is a

periosteal and osseous hyperplasia. The compression by this process of the nerve trunks in their narrow canals explains the symptoms.

Diagnosis is made by direct inspection of the region, using strong white light. Sometimes Holmes' nasopharyngoscope is of great help. A knowledge of normal appearances is, of course, necessary. Emphasis should be laid on the color, thickness and translucency of the membrane of the olfactory fissure, and the size and character of the posterior tip of the middle turbinate and the plica septi. Normally, the membrane is like thin, pink, silk velvet, smooth and transparent; it is moist but not wet and does not glisten. In hyperplastic sphenoiditis the mucous membrane of this district may show velvetlike thickening and roughening without much change of color, or it may be manifestly swollen, red and wet. It is usually accompanied by a scant serous secretion, but secretion is sometimes totally absent. The condition is rarely unilateral, though it may be more marked on one side.

Relief of low grade hyperplastic postethmoidal sphenoiditis has, in Sluder's experience, often been accomplished by the the sedulous use of $1\frac{1}{2}$ or 2 per cent alkalin saline solution twice or thrice daily snuffed from the palm of the hand. Sluder uses equal parts of a sodium bicarbonate, sodium chlorid and sugar of milk, dispensed in tablets. Application of 2 per cent silver nitrate may be helpful. Sluder has also used satisfactorily one-half or one-third per cent of phenol in oleum petrolatum in 5 c. c. amounts; this is injected forcibly into the olfactory fissure with a syringe. If these means fail, the sinuses should be opened and for this purpose intranasal surgery seems to offer all that is possible.

SURGERY OF THE PARANASAL CELLS—SLUDER'S TECHNIC.

Anesthesia.—Morphin, $1/6$ gr., with hyoscin, $1/200$ gr., is given a half hour before operation. One drop of a 90 per cent aqueous solution of cocain in an aluminum applicator is applied for five minutes under the posterior tip of the middle turbinate; "it is then changed to rest just back of the tip in an upward and backward direction, to lie approximately over the trunks in the sphenopalatine foramen and allowed to re-

main another five minutes." At the time of changing the posterior applicator, an anterior applicator (a small wooden, toothpicklike stick), carrying a half drop of the solution, is passed up along the anterior limit of the nose to the roof and allowed to remain five minutes. Anesthesia thus obtained is complete and comprehensive for that half of the nose.

Operation.—Sluder uses a small knife, with a cutting edge turned at a right angle to the shaft, and sharpened so as to cut on the pull. It is also sharpened on the face parallel to the shaft. This knife is introduced under the anterior end of the middle turbinate as far as the uncinate process and as high as the cribriform plate, with its cutting edge facing forward. It is then rotated somewhat inward and drawn forward and downward. Then the knife is reintroduced along the internal (superior) face of the turbinate, going well back of the posterior limit of the first incision, and with the cutting edge directed downward and forward, the middle turbinate is severed from its attachment, and most of the ethmoid capsule is resected by three or more forward strokes. To open the sphenoid the knife is then passed along the cribriform plate, cutting edge downward, until the anterior wall of the sphenoid is reached, just below the roof; at this point the wall is thin and easily penetrated, after which the knife is drawn forward and downward to the floor of the sphenoid. From the uppermost limit of this cut the knife, having again been introduced, is rotated thirty degrees outward and brought forward to uncover any high postethmoidal cell. The opening in the sphenoid wall thus made may be cleared out or enlarged by Knight forceps with extra long jaws.

SURGERY OF THE MAXILLARY ANTRUM.

The idea of entering the antrum through the nasal wall and of conserving the lower turbinate has occurred to various surgeons, but so far as Sluder knows his was the first complete procedure in 1906. The lower turbinate is severed from the lateral wall as far back as its posterior fourth. The detached part is pushed upward, and the lateral wall of the lower meatus is removed with a special forceps; then the severed portion of the inferior turbinate is pushed downward so as to

allow removal of the middle meatal-antral wall as desired. The lower turbinate is then replaced in its original position and sutured or held in place by a gauze pack.

CASE HISTORIES.

Over sixty pages of interesting and exemplary case histories follow, including vacuum frontal headache, nasal ganglion neuralgia, hyperplastic sphenoiditis, ophthalmoplegic migraine vertigo, optic neuritis, tic douelureux, iritis, orbital phlegmon, etc.

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Bruenings. A new method for the proof of malingerers of deafness.

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Northwest Med., Seattle, 1918—XVII—298.

Loeffler, W. Herpes zoster of nose and face, with paralysis of ocular muscles.

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Walker, Clifford B. Distortions of the visual fields in cases of brain tumor; chiasmal lesions, with especial reference to homonymous hemianopsia with hypophyseal tumor.

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Number	Serial Number	DATE	NAME	RANK			Chronic Mastoid	Acute Mastoid	Acute Catarh	PREDISPOSING CAUSE							
										Tonsillitis	Antrum Inflammation	Ethmoiditis	Frontal Sinusitis	Sphenoid	Measles	Scarlet Fever	Diphtheria
1		Sept. 26, 1917	Armas, Joe	Pvt., Co. M., 331 Inf.		1	1										
2		Dec. 16, 1917	Thomas, Elmslie T.	Pvt., Co. B., 308 Eng.		1	1										
3		Dec. 18, 1917	Wade, Claude	Pvt., Co. 25, 7th Tr. Bn.		1		1							1		
4	1,937,543	Dec. 28, 1917	Franklin, Clem	Pvt., Co. H., 329 Inf.		1	1										
5	1,955,559	Jan. 1, 1918	Fetherolf, Edgar B.	Pvt., Co. D., 324 F. A.		1	1										
6		Jan. 1, 1918	Kline, Harper O.	Pvt., Bat. E., 322 F. A.		1	1										
7		Jan. 1, 1918	Moore, Haze (Col.)	Pvt., Co. D., 317 Eng.			1										
8	1,943,620	Jan. 9, 1918	Berg, Regis	Pvt., Co. A., 331 Inf.		1	1										
9	1,936,777	Jan. 9, 1918	George, Clair	Pvt., Co. E., 329 Inf.		1	1										
10		Jan. 14, 1918	Colquitt, Otha (Col.)	Pvt., Co. A., 317 Eng.			1										
11	1,942,191	Jan. 15, 1918	Nickis, James	Pvt., Co. L., 330 Inf.		1									1		
12		Jan. 27, 1918	Burgell, Fred. C.	Pvt., Co. K., 329 Inf.		1									1		
13	1,936,274	Jan. 29, 1918	Fulkert, Henry F.	Pvt., Co. C., 329 Inf.		1									1		
14	1,960,335	Feb. 8, 1918	Allen, Tracy W.	Pvt., Am. Co. 329, S. Tr., 308		1	1										
15	1,955,299	Feb. 11, 1918	Douglas, Verner	Pvt., Bat. B., 324 F. A.		1	1										
16	1,948,580	Feb. 15, 1918	Memoe, Frank V.	Pvt., Co. G, 332 Inf.		1	1										
17		Feb. 15, 1918	Cerlettee, Ray G.	Sgt., Officers Training Camp		1	1										
18	1,935,768	Feb. 18, 1918	Cox, William F.	Corp'l, Co. A, 329 Inf.		1				1							
19		Feb. 18, 1918	Markoullis Stabros	Pvt., 3rd Co., 1st T. Bn.		1	1										
20		Feb. 19, 1918	Putnam, John	Pvt., Hdqts. Co., 331 Inf.		1									1		
21	1,971,027	Feb. 20, 1918	Chio, Clyde	Pvt., Base Hosp. Detach.		1	1										
22	1,945,994	Feb. 20, 1918	Warren, Harold M.	Pvt., Co. K, 331 Inf.		1				1	1		1				
23		Feb. 20, 1918	Christie, Wm. H.	Pvt., Bat. D, 323 F. A.		1			1					1			
24		Feb. 22, 1918	Tresaler, Henry	Pvt., Co. 14, 4th Tr. Bn.		1	1										
25		Feb. 23, 1918	Gross, Jerry	Pvt., Co. C, 319 F. S. Bn.		1	1										
26		Feb. 23, 1918	Spear, Wm. C.	Pvt., Co. I, 330 Inf.		1									1		
27	1,940,925	Feb. 26, 1918	Rhodes, Geo. R.	Pvt., Co. F, 330 Inf.		1	1										
28	1,943,958	Feb. 26, 1918	Grunder, Earl K.	Pvt., Co. B, 331 Inf.		1	1										
29	1,941,898	Feb. 28, 1918	Rider, Richard	Pvt., Co. K, 330 Inf.		1	1										
30		Mar. 9, 1918	Dean, Orville	Pvt. Co., 308 Am. Tn.		1	1										
31	1,949,600	Mar. 11, 1918	Polzi, John	Pvt., Co. L, 332 Inf.		1	1										

DISPOSING CAUSE				Condition Found in Mastoid	Condition of Patient at Time of Operation	Radical Operation		Metastatic Abscesses, Number and Location	0 = No. Exam. of Blood. 1 = Yes. 2 = No. Infection. 1 = Streptococci Number Serum Injections		PRESENT CONDITION APRIL 1, 1918			Cured	Improved	Not Improved	Primary Blood Clot	Blood Clot Held	Blood Clot Broke Down	Secondary Blood Clot	Blood Clot Held	Blood Clot Broke Down	No. of Days From Onset of Middle Ear Inflamm. (Acute), to date of Operation
Frontal Sinusitis	Sphenoid	Measles	Scarlet Fever			Right Side	Left Side		0 = No. Exam. of Blood. 1 = Yes. 2 = No. Infection. 1 = Streptococci Number Serum Injections	Middle Ear	Wound	Physical											
				Pneumatic Tip, Much Pus	Good	1	1		0		Dry	Healed	Fair	1									26
				Very extensive necrosis	Fair	1	1		0		Moist	Healed	Fair	1									21
			1	Extensive necrosis, Dura exposed	Poor	1	1		0		Moist	Not healed	Fair	1	1	1							23
				Much involved	Good	1	1		0		Dry	Healed	Good	1									28
				Dura and lat. sinus exposed	Very poor	1	1	2 Sub Deltoid 1 Gluteal L.	1	1	Dry	Healed	Good	1	1	1							12
				Extensive necrosis	Very poor	1	1				Dry	Healed	Good	1	1	1							37
			1	Antrum filled with pus and granulations	Very bad	1	1	Buccal abscess, Rt.			Moist	Not healed	Good	1									13
				Very extensive	Poor	1	1				Moist	Healed	Fair	1	1	1	1	1					13
				Lat. sinus exposed	Good	1	1				Dry	Healed	Good	1				1	1				11
			1	Antrum filled with pus and granulations	Pneumonia Poor	1	1				Dry	Healed	Good	1									14
				Large cholesteatoma	Good		1				Dry	Healed	Good	1		1	1						
			1	Extensive destruction	Very poor	1	1				Dry	Not healed	Good	1	1	1							7
			1	Cortical sinus	Poor	1	1				Moist	Not healed	Good	1									9
				Granulation around lat. sinus—pus. Extensive destruction	Fair	1	1	1. Right Gluteal	1	0	Dry	Not healed	Fair	1									28
				Pus, moderate destruction	Fair	1	1				Dry	Not healed	Good	1				1	1				12
				Extensive destruction	Poor	1	1				Dry	Alm't healed	Good	1									5
				Extensive involvement, pus and granulation	Bad	1	1	1 Sub Scap. 2 Sub Deltoid 1 SternoClav.L	1	1	5	Moist	Not healed	Poor	1								10
				All cells full of pus	Fair	1	1				Moist	Not healed	Good	1									11
				Ext. destr. and pus	Bad	1	1				Dry	Healed	Fair	1									16
			1	Ext. involvement	Poor	1	1				Moist	Not healed	Good	1									36
				Ext. involvement	Poor	1	1				Dry	Not healed	Good	1					1	1			15
1			1	Ext. involvement	Poor	1	1				Dry	Not healed	Good	1									18
			1	Ext. involvement, cellular destr.—abscess	Very poor	1	1				Moist	Not healed	Poor	1									8
				Tip cells full of pus	Poor	1	1				Dry	Not healed	Fair	1									15
				All of mastoid involved	Poor	1	1				Moist	Not healed	Good	1					1	1			8
			1	Dura exposed	Fair	1	1				Moist	Not healed	Fair	1									7
				Entire tip removed	Poor	1	1				Dry	Not healed	Good	1									14
				Pus under pressure	Poor	1	1				Dry	Not healed	Good	1					1	1			23
				Extensive granulation pus, emiss. vein opened	Poor	1	1				Dry	Not healed	Good	1									20
				Extensive involvement, much pus	Poor	1	1				Moist	Not healed	Good	1									9
				Acute																			

Operation	Radical Operation • Simple Mastoidectomy			Metastatic Abscesses, Number and Location	0=No. Exam. of Blood. 1=Yes. 2=No. Infection. 1=Streptococci Number Serum Injections	PRESENT CONDITION APRIL 1, 1918			Cured	Improved	Not Improved	Primary Blood Clot	Blood Clot Healed	Blood Clot Broke Down	Secondary Blood Clot	Blood Clot Healed	Blood Clot Broke Down	No. of Days From Onset of Middle Ear Inflamm. (Acute), to date of Operation.	No. of Days Between Operation and Cure		
	Right Side	Left Side				Middle Ear	Wound	Physical													
	1	1	1		0		Dry	Healed	Fair	1					1	1		26	53	Mitral Stenosis, November 16, 1917. Seco	
	1	1	1		0		Moist	Healed	Fair	1		1	1					21	23	8 years O.M.P.C.R. In hospital, c/o Chron	
		1	1		0		Moist	Not healed	Fair	1	1	1		1	1		1	23		Scarlet fever 9 years ago. Trouble with en	
		1	1		0		Dry	Healed	Good	1								28	45	Tonsillectomy January 23, 1918. Develop	
oor	1	1	1	2 Sub Deltoid 1 Gluteal L.	1 1		Dry	Healed	Good	1	1	1	1					12	70	Gained 24 lbs. in one month. Metastatic	
oor	1	1	1				Dry	Healed	Good	1	1	1	1					37	50		
ad	1	1	1	Buccalabscess, Rt.			Moist	Not healed	Good	1								13		C/o pneumonia, op. made under Novocain,	
	1		1				Moist	Healed	Fair	1	1	1	1	1	1			13		Ear suppurative, began after measles 9 ya	
	1		1				Dry	Healed	Good	1					1	1		11		Began after 7, 20 years ago. Secondary bl	
onia	1	1					Dry	Healed	Good	1								14	41	Operation during pneumonia, local; electric 28, 1917.	
			1				Dry	Healed	Good	1		1	1						35		Left ear discharging since childhood.
oor	1	1					Dry	Not healed	Good	1	1	1	1					7			
	1	1					Moist	Not healed	Good	1								9		Subtemporal abscess acute, right, January	
	1	1		1. Right Gluteal	1 0		Dry	Not healed	Fair	1								28		Chill before operation, temperature 105 deg	
	1	1					Dry	Not healed	Good	1					1	1		12		Secondary blood clot, March 18, 1918.	
	1	1					Dry	Alm't healed	Good	1								5		Suffered from arthritis. C/o teeth and ton	
	1	1		1 Sub Scap. 2 Sub Deltoid 1 SternoClav.L	1 1 5		Moist	Not healed	Poor	1								10		Temperature 105 degrees time operated. I	
	1	1					Moist	Not healed	Good	1								11		Empyema—Ethmoid cells, R. & L. Opera	
	1	1					Dry	Healed	Fair	1								16	30	Arthritis and anaemic. Secondary blood c	
	1	1					Moist	Not healed	Good	1								36	40	Subperiosteal abscess, L.	
	1	1					Dry	Not healed	Good	1					1	1		15	41	Secondary blood clot, March 18, 1918.	
	1	1					Dry	Not healed	Good	1								18			
oor	1	1					Moist	Not healed	Poor	1								8		Empyema left antrum. Opened February	
	1	1					Dry	Not healed	Fair	1								15		Multiple arthritis, right and left knees, rig	
	1	1					Moist	Not healed	Good	1					1	1		8		Had recurrent purulent otitis media, left,	
	1	1					Moist	Not healed	Fair	1								7		Also had O. M. P. A. Rt., February 15,	
	1	1					Dry	Not healed	Good	1								14			
	1	1					Dry	Not healed	Good	1					1	1		23		Secondary blood clot, March 18, 1918.	
	1	1					Dry	Not healed	Good	1								20		Recurrent purulent otitis media, L.	
	1	1					Moist	Not healed	Good	1								9	47	Right antrum opened, March 9, 1918. Ad	

REMARKS	Anesthetic Used		Blood Count at Time of Operation	Tonsils and Adenoids Removed	Tonsils and Adenoids Not Removed
	Local	General			
6, 1917. Secondary Blood Clot, October 22, 1917.			12,000		
hital, e/o Chronic Purulent Bronchitis. Working as Orderly. Recom. for discharge, March 19, 1918. e/o Bronchitis.					
trouble with ears since then. Will require Radical.				1	
1918. Developed measles February 25, 1918.				1	
Metastatic abscess.			17,400		
				1	
der Novocain, 1% sol. Abscess of scalp R. Mastoid Region				1	
measles 9 years. Secondary blood clot, March 18, 1918.				1	
Secondary blood clot, March 28, 1918.			6,600	1	
local; electric drill, 1% solution, 300 min. Aposthesine, not satisfactory. Also had O. M. P. A. Rt., December			17,800	1	
ldhood.				1	
				1	
ight, January 28, 1918.					
perature 105 degrees. Tonsils and adenoids removed, January 23, 1918.			19,400	1	
18, 1918.			12,300	1	
teeth and tonsils.				1	
e operated. Large number strepto. in blood.			13,700	1	
. & L. Operated March 18, 1918.				1	
ndary blood clot, March 9, 1918.			12,100	1	
18, 1918.					
				1	
ned February 8, 1918.				1	
eft knees, right ankle.				1	
s media, left, several years.				1	
February 15, 1918. Developed mumps, R, March 15, 1918.			13,700	1	
			11,600	1	
18, 1918.				1	
dia, L.				1	
9, 1918. Adenoids.			12,400	1	
(1. Mastoiditis acute purulent, left. Had trouble with left ear 3 years ago.			20,400		

Tip cells full of pus	Poor	1	1					Dry	Not healed	Fair	1						15		
All of mastoid involved	Poor	1	1					Moist	Not healed	Good	1			1	1		8		
Dura exposed	Fair	1	1					Moist	Not healed	Fair	1						7		
Entire tip removed	Poor	1	1					Dry	Not healed	Good	1						14		
Pus under pressure	Poor	1	1					Dry	Not healed	Good	1			1	1		23		Se
Extensive granulation pus, emiss. vein opened	Poor	1	1					Dry	Not healed	Good	1						20		Re
Extensive involvement, much pus	Poor	1	1					Moist	Not healed	Good	1						9	47	Rig
Entire mastoid necrosed	Acute Meningitis Purulent	1		1			1	1	2								4		Die
Mastoid oedema extensive involvement, pus gran.	Poor	1	1					Dry	Not healed	Good	1						19		Chr
Cortical sinus, pus, extensive large tip cell	Poor	1	1					Moist	Not healed	Poor	1						23		Dev
Extensive granulation cell destruction, especially in floor of middle fossa.	Poor	1	1					Moist	Not healed	Fair	1						17		Tem
Extensive breaking down of cells, pus	Fair	1	1					Moist	Not healed	Good	1						20		Had
Extensive involvement of cells, pus	Good	1	1					Moist	Not healed	Good	1						10		Had
Large tip cell and granulation	Fair	1	1					Moist	Not healed	Good	1						3		Shor
Cortical fistula, large tip abscess, extensive	Good	1	1					Moist	Not healed	Fair	1						17		Subr
Pus under pressure, large cell near surface, antrum and tip cell, pus	Poor	1	1					Moist	Not healed	Fair	1						5		Novo
Pus under cortex tip, cells in antrum, 3 cells posteriorly	Poor	1	1					Moist	Not healed	Poor	1						15		
Soft tissues oedematous, antrums, pus and gran. cells ext. involved	Good	1	1					Moist	Not healed	Good	1						12		Large
Pus under cortex in tip, antrum	Good	1	1					Moist	Not healed	Good	1						27		Masto
Extensive destruction, gran. pus, very high antrum	Good	1	1					Moist	Not healed	Good	1						40		
All cells full of pus	Fair	1	1							Fair	1						32		Chron
Granulations in antrum and middle ear. Bone softened (tegmen)	Poor	1	1							Dead							70		Died
Granulations and pus, middle ear and attic	Fair	1	1				1			Poor	1						17		Chills
Granulations and pus, mid ear	Fair	1	1				1			Fair	1						60		No spe
Pus granulations, necrosed bone	Fair	1	1				1			Poor	1								Came
Pus-sinus cort., with granulations	Poor	1	1							Fair	1								
Antrums and posterior cells, pus	Bad	1	1				1			Poor	1								Had s
2		8	42	17	33														

see that came to operation through violent inflammation following exposure in training camp. One Chronic Case with extensive Necrosis, but not acutely
ards, with resulting virulence of the germs.

inflammation following exposure in training camp. One Chronic Case with extensive Necrosis, but not acutely inflamed, was operated upon, at the request

inflammation following exposure in training camp. One Chronic Case with extensive Necrosis, but not acutely inflamed, was operated upon, at the request

February 8, 1918.				1
es, right ankle.				1
, left, several years.				1
February 15, 1918. Developed mumps, R, March 15, 1918.			13,700	1
			11,600	1
1918.				1
				1
3. Adenoids.			12,400	1
{1. Mastoiditis acute purulent, left. 2. Meningitis acute suppurative. 3. Streptococci septicemia.	Had trouble with left ear 3 years ago.		20,400	
, bilateral. R. antrum intranasal operation.			14,400	1
March 19, 1918. Type IV. Subperiosteal Abscess.			5,900	
operation. Fell to normal next day and remained so.			8,700	1
time of operation. Had O. M. P. A., Rt., February 21, 1918.				1
, operated same time. Lue Caldwell.			21,300	1
exudative membrane, large tip cell.			8,200	
spontaneous rupture through cortex.			17,200	1
0 min. Incision 2 inch., bone drill. Good anaesthesia. O. M. P. A. L., March 17, 1918.			18,200	1
			13,100	1
bezold. Zygoma cells involved.			8,600	1
nt. Left maxillary sinusitis.			12,500	1
			9,400	1
opened and drained.				1
stoiditis, sub acute purulent Rt. Meningitis acute of Otitic origin.			10,600	1
days ago. 2nd Op. Radical. Ext. exposure of lat. sinus, gran.			6,200	1
ness mastoid. Infected cell around lat. sinus. Dura, dark and pultaceous.			16,600	1
94½, and meningitis symptoms. Mild delirium, no pain. Extensive necrosis, dura exposed.			15,000	1
			15,200	1
14. Metastatic inflammation left knee, one week ago. Aspirated then, and again today.			14,200	1

at the request of the patient.